INCIDENCE REPORT

Incidence Report on Primary Central Nervous System Tumours in Canada (2018-2022)

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In partnership with:

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Executive Summary

Primary central nervous system (CNS) tumours comprise a heterogeneous group of neoplasms that arise from the brain, spinal cord, meninges, and other neural structures. Although some CNS tumours are non-malignant, their location within the central nervous system means they can still result in significant morbidity and mortality. Comprehensive surveillance is therefore essential to better understand the national burden of disease and support research, clinical care, and public health planning.

This comprehensive incidence report provides population-based statistics on all primary CNS tumours diagnosed in Canada for the period 2018-2022. Drawing on data from all provincial and territorial cancer registries, as compiled by Statistics Canada and incorporating Quebec for the first time, the report describes the overall incidence of primary CNS tumours stratified by tumour behaviour (malignant vs. non-malignant), histopathological group, age, sex, and geographic region. The analysis is based on approximately 42,500 primary CNS tumour diagnoses. The overall age-standardized incidence rate (ASIR) was 22.09 per 100,000 (95% CI: 21.88-22.31), with malignant primary CNS tumours accounting for an ASIR of 8.56 per 100,000 and non-malignant primary CNS tumours for 13.54 per 100,000.

Among all histopathological types, meningioma was the most common, with an ASIR of 5.77 per 100,000, representing 26.1% of all primary CNS tumours and 41.8% of non-malignant CNS tumours. Glioblastoma was the predominant malignant type (ASIR: 4.52 per 100,000), accounting for 20.64% of all primary CNS tumours and 53.10% of malignant tumours. A high proportion of tumours were unclassified (ASIR: 3.56 per 100,000; 16.25% of all CNS tumours), largely driven by non-malignant unclassified CNS tumours in Ontario. This trend reflects variability in case ascertainment, differences in access to neuropathological services, and the reliance on non-pathology-confirmed case sources in some jurisdictions. Addressing the inconsistencies across provinces remains an important surveillance priority.

Incidence patterns varied significantly by sex and age. The overall ASIR was higher in females (23.20 per 100,000) than males (20.48 per 100,000), driven primarily by meningiomas, which occurred at twice the rate in females compared to males (8.43 vs. 4.00 per 100,000). On the contrary, males had higher rates of diffuse astrocytic and oligodendroglial tumours. Incidence increased with age across most tumour types. In children aged 0-14, other astrocytic tumours had the highest ASIR (1.05 per 100,000), and embryonal tumours showed a marked sex disparity, occurring at nearly double the rate in male children compared to female children (0.83 vs. 0.49 per 100,000).

Geographic variation in CNS tumour incidence was substantial across Canada. Ontario recorded the highest ASIR for all primary CNS tumours (23.92 per 100,000), while the Atlantic region recorded the lowest (18.34 per 100,000). For malignant tumours, the Atlantic region had the highest rate (9.65 per 100,000) and the Prairie region had the lowest (7.55 per 100,000). The most pronounced variation occurred in non-malignant tumours, ranging from 8.69 per 100,000 in the Atlantic region to 15.47 per 100,000 in Ontario. Quebec had high primary CNS tumour rates compared to most

other Canadian provinces and regions. The overall ASIR for all primary CNS tumours in Quebec was 22.99 per 100,000, marginally lower than Ontario's (23.92 per 100,000) but substantially higher than the Atlantic region, British Columbia, and the Prairie region. These disparities are largely attributed to differences in case ascertainment practices, particularly variations in the extent to which provinces have implemented discharge abstract database linkages to identify non-malignant cases rather than true differences in disease occurrence.

Rates were standardized to the 2000 U.S. population to enable direct comparison with the Central Brain Tumour Registry of the United States (CBTRUS). The overall ASIR in Canada (18.46 per 100,000) was lower than in the United States (26.05 per 100,000). This gap was driven primarily by non-malignant tumours, where the Canadian rate was approximately half the U.S. rate (11.29 vs. 19.19 per 100,000), with meningiomas accounting for the largest absolute difference (Canada: 5.10 vs. U.S.: 10.99 per 100,000). By contrast, rates for malignant tumours in adolescents and young adults (AYAs) and adults aged 40 and older were modestly higher in Canada than in the United States. Canada also had a higher rate of unclassified tumours (3.03 vs. 1.02 per 100,000), reflecting differences in case ascertainment for non-malignant CNS tumours in several provinces.

Overall, this report provides a vital baseline for CNS tumour surveillance in Canada and confirms that the distribution of tumour types is consistent with findings from the United States and international literature. However, underreporting of non-malignant tumours, a high proportion of unclassified cases and regional inconsistencies in ascertainment continue to affect the completeness of Canadian primary CNS tumour data. The BTSRC recommends expanding discharge abstract database linkages to all provinces, reducing unclassified tumour rates through improved access to specialized neuropathological and molecular diagnostic services in an effort to align future surveillance efforts with the 2021 WHO Classification of CNS Tumours.

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Introduction

Primary central nervous system (CNS) tumours represent a diverse group of neoplasms arising from the brain, spinal cord, meninges, and other neural structures. These tumours pose significant clinical challenges due to their anatomical location, which can result in substantial morbidity and mortality even when benign[1]. Unlike most other cancer types, both malignant and non-malignant CNS tumours are reportable to Canada's cancer registries[2,3].

The Brain Tumour Surveillance Research Collaborative (BTSRC) is a multidisciplinary partnership comprising epidemiologists, biostatisticians, neuro-oncology experts, and provincial and territorial cancer registries, with the goal of improving CNS tumour surveillance in Canada and ensuring that every brain tumour diagnosed nationwide is counted. Whereas previously, Canada relied on data from the United States and Canadian resources to guide Canadian research, raise awareness, and support treatment programs, the establishment of the BTSRC has, since 2017, enabled population-based and comprehensive surveillance reporting for Canadians[4]. The objectives of this work, are to describe the overall incidence of primary CNS tumours in Canada, stratified by tumour behaviour (malignant vs. non-malignant), to characterize the distribution of CNS tumours by major histopathological groups and specific histopathological subtypes and to examine patterns of CNS tumour incidence by age group, sex, and geographic region. This comprehensive population-based statistic on primary CNS tumour incidence in Canada for the period 2018–2022 utilizes data from all provincial and territorial cancer registries compiled by Statistics Canada.

Background

The clinical significance of CNS tumours and the challenges in achieving complete case ascertainment, necessitated efforts to enhance surveillance infrastructure and methodologies. In 2007, Private Members' motion - was introduced in the Canadian House of Commons, calling for improved tracking and registration of brain tumours in Canada[5]. This legislative attention underscored the recognition that comprehensive CNS tumour surveillance is essential for understanding disease burden, monitoring temporal trends, evaluating the effectiveness of prevention and treatment strategies, and ultimately improving outcomes for patients. The Brain Tumour Foundation of Canada identified this gap in Canadian brain tumour surveillance information and prioritized development of a Canadian report on brain tumours, similar to that periodically published by the Central Brain Tumour Registry of the United States[6]. A collaboration to explore the feasibility of achieving this goal started between the Brain Tumour Foundation of Canada and Dr. Faith Davis at the University of Alberta in 2012. The Public Health Agency of Canada (PHAC) undertook an assessment to quantify the counts and rates of non-malignant CNS tumours captured in the Canadian Cancer Registry (CCR) from 2011 to 2015 to evaluate case completeness in response to a private members' motion (M235)[7,8]. The BTSRC represents a surveillance research collaborative that aims to provide comprehensive population-based data on CNS tumour incidence, prevalence, and survival in Canada[2,8]. By combining data from cancer registries with additional sources and employing standardized methodologies aligned with international best practices, such

initiatives enhance the quality and completeness of Canadian CNS tumour surveillance data.

A cancer registration system has been in place in Canada for many years, and provincial/territorial registries have been useful at the regional level for understanding the burden of disease, evaluating trends in disease occurrence and providing an infrastructure for clinical, epidemiologic and health services research, particularly for common cancers such as lung, breast, colorectal and prostate cancer[9]. Cancer surveillance in Canada operates through a well-established network of provincial and territorial cancer registries that collectively report data to Statistics Canada for compilation in the Canadian Cancer Registry (CCR)[10]. Since 1987, a national report on cancer, i.e., the Canadian Cancer Statistics (CCS) report, has been produced annually by the Canadian Cancer Society's Advisory Committee on Cancer Statistics, a joint effort by the Canadian Cancer Society, Statistics Canada, PHAC, and the provincial/territorial cancer registries[7]. These CCS reports include separate incidence rates and mortality rates for all cancers, including brain cancers.

Initially, the BTSRC launched a collaborative initiative with four provincial cancer registries (Alberta, British Columbia, Manitoba, and Ontario) to compile complete, high-quality data on all primary CNS tumour diagnoses from 2010 to 2015. The provincial cancer registries participated in additional case-ascertainment activities, meetings and workshops to identify strategies for improving the routine capture of non-malignant CNS tumours, ensuring that the information collected was accurate and comprehensive[7]. Building on this strong foundation, the BTSRC later expanded its surveillance across Canada by utilizing CCR data.

Methodological Notes

Data Collection

Data on new tumour diagnoses are collected by each provincial and territorial cancer registry through passive surveillance for individuals residing in their jurisdiction at the time of diagnosis[11]. These data are then reported to Statistics Canada for compilation in the Canadian Cancer Registry[10]. The collection and use of data in these registries are governed by provincial and territorial health legislation, as well as the Statistics Act at the national level[12]. Designed to capture all relevant cases through routine diagnostic care and interactions with the healthcare system, passive surveillance systems depend on healthcare providers and laboratories to report new cases to provincial and territorial health agencies for inclusion in disease registries. Data on tumour diagnoses most commonly reach cancer registries through pathology reports, radiology reports, or when a patient is treated at an oncology clinic or prescribed chemotherapy[2,11]. Healthcare professionals involved in these processes are responsible for reporting these events to cancer registries[11]. Highly trained tumour registrars receive these notifications and review the patient's medical records to obtain comprehensive data on their diagnosis, dates of diagnosis and death, if applicable, and demographic characteristics such as age, sex, and geographic location[11]. This well-established system for collecting data in cancer registries effectively identifies malignant tumours. Given that non-malignant

CNS tumours are often diagnosed and managed differently than malignant tumours, the mechanisms through which data on these tumours reach cancer registries also differ[11]. While some non-malignant CNS tumours are captured by cancer registries through traditional case-ascertainment activities, evidence indicates that these processes frequently overlook a significant proportion of these diagnoses[3]. Reviews of additional databases are often used to identify non-malignant cases that were missed through other routine case-ascertainment activities. Specifically, the review of the Discharge Abstract Database are employed to identify patients treated in hospitals for non-malignant CNS tumours[13,14]. Although progress has been made in registering non-malignant CNS tumours in Canada for diagnosis years from 2010 onward, further efforts are required to ensure complete capture of these tumours across all provinces and territories. Consequently, while the estimates presented in this report reflect the most comprehensive data available for Canadians, caution should be exercised when interpreting the frequency and distribution of non-malignant CNS tumours.

Disease Surveillance Measures

The primary measures discussed in this report are incidence rates. Incidence rates measure the frequency of new cases occurring in a population over a defined time[15]. These rates are expressed as the number of cases per 100,000 persons. Age-specific rates are measures of the frequency of new cases within a specific age category during a specific time. Age-standardized rates are adjusted for the effects of age on the risk of being diagnosed with a specific disease, using a reference population. This adjustment allows for comparisons across different geographic regions and over time, as it accounts for variations in the age structure of the populations being compared.

Tumour Classification Methods

There are numerous distinct primary central nervous tumours, which can be classified according to the following characteristics or a combination of them: topography (site), histology, behaviour, and molecular features. The disease groups presented in this report incorporate histopathological features and behaviours. The classification system used by cancer registries in Canada is the International Classification of Diseases for Oncology, 3rd edition, or ICD-O-3[16], which is aligned with the 2016 WHO Classification of Tumours of the Central Nervous System as of the most current diagnosis year 2022[17]. This multiaxial classification system assigns alphanumeric codes for the anatomical site of the tumour (topography) and numeric codes for its histopathology and behaviour. Primary CNS tumours were defined as those occurring at the following ICD-O-3 sites: C70.0-C70.9, C71.0-71.9, C72.0-C72.9, C75.1-C75.3, and C30.0 (limited to histopathology codes 9522-9523). Histopathology codes were grouped into categories based on classifications used by the Central Brain Tumour Registry of the U.S. (CBTRUS) in 2025[18]. Primary CNS tumours are categorized as having one of three behaviours: benign, uncertain whether benign or malignant, or malignant. We dichotomized tumours based on behaviour as either non-malignant or malignant, with uncertain behaviours being categorized as per CBTRUS.

Data Analysis Methods

The estimates produced for this report include counts, proportions, and age-standardized rates. To allow valid

comparisons of rates over time, across Canadian jurisdictions, and with the U.S., all rates were age standardized. Population estimates for all rate calculations were obtained from Statistics Canada[19]. Data analysis was conducted using R (version 4.5.1). Figures were generated using STATA (version 18) and Excel.

Multiple Primaries. Individuals may be diagnosed with more than one primary CNS tumour. This phenomenon means that multiple tumours can originate in the brain or other parts of the CNS independently, rather than metastasizing from an existing tumour. All primary CNS tumours, defined according to the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program's multiple primary rules[3,11], were included in incidence estimates; hence, the number of patients and tumours may differ.

Age-Standardized Rates. Average annual age-standardized incidence rates (ASIR) and corresponding 95% confidence intervals (CI) per 100,000 person-years presented in this report were calculated using direct standardization. The 2016 Canadian standard population was used as the reference. ASIRs were also estimated using the 2000 U.S. standard population to enable comparison with the US CNS tumour incident rate estimates presented by the CBTRUS, which uses the same standard population. The incidence estimates from Quebec and Nova Scotia were based on cases diagnosed from 2013 to 2017 and 2015 to 2019, respectively, since the available data did not extend beyond this period, and we made the assumption that incidence rate remains stable for 2018–2022. In this report, estimates are stratified by histopathology, age group at diagnosis, tumour behaviour, sex, and region or province. Sex categories used in this report are male and female.

Disclosure Rules and Rounding. Measures were implemented to protect the confidentiality of individuals underlying the data. All presented total case or person counts are randomly rounded using an unbiased random rounding scheme with a base of five, and estimates based less than five observed cases were grouped.

Results

The primary CNS tumour incidence estimates are based on approximately 42,500 CNS tumours diagnosed in 41,590 Canadians between 2018 and 2022. Age-standardized incidence rates (ASIR) are presented in Tables 2-10. The ASIR for all primary CNS tumours was 22.09 per 100,000 (95% CI: 21.88–22.31). The ASIR for malignant CNS tumours was 8.56 per 100,000 (95% CI: 8.42-8.69), while the ASIR for non-malignant CNS tumours was 13.54 per 100,000 (95% CI: 13.38-13.71).

Tumours of meninges were most common primary CNS tumours and among non-malignant CNS tumours (Figure 1, Table 2). Among tumours of the meninges, meningioma was the most common histopathological type, with an ASIR of 5.77 per 100,000 (95% CI: 5.66–5.87), accounting for 26.1% of all CNS tumours and 41.8% of all non-malignant CNS tumours (Figure 2, Table 2). Diffuse astrocytic and Oligodendroglial tumours were the second most common overall. (Figure 1, Table 2). Of Diffuse Astrocytic and Oligodendroglial tumours, glioblastoma was the most common histopathology (ASIR: 4.52 per 100,000; 95% CI: 4.42-4.61) (Figure 2). It accounted for 20.64% of all CNS tumours and 53.10% of all

malignant CNS tumours. Unclassified tumours were the third most common overall and the second most common among both malignant and non-malignant tumours (Figure 1, 2 and Table 4). Of unclassified tumours, Unspecified Neoplasm was the most common histopathology, with an ASIR of 3.56 per 100,000 (95% CI: 3.47–3.64), accounting for 16.25% of all CNS tumours, 8.36% and 21.29% of all malignant and non-malignant CNS tumours, respectively.

Figure 1: Distribution of major histopathology groups of all primary central nervous system tumour by behaviour, Canada, 2018-2022

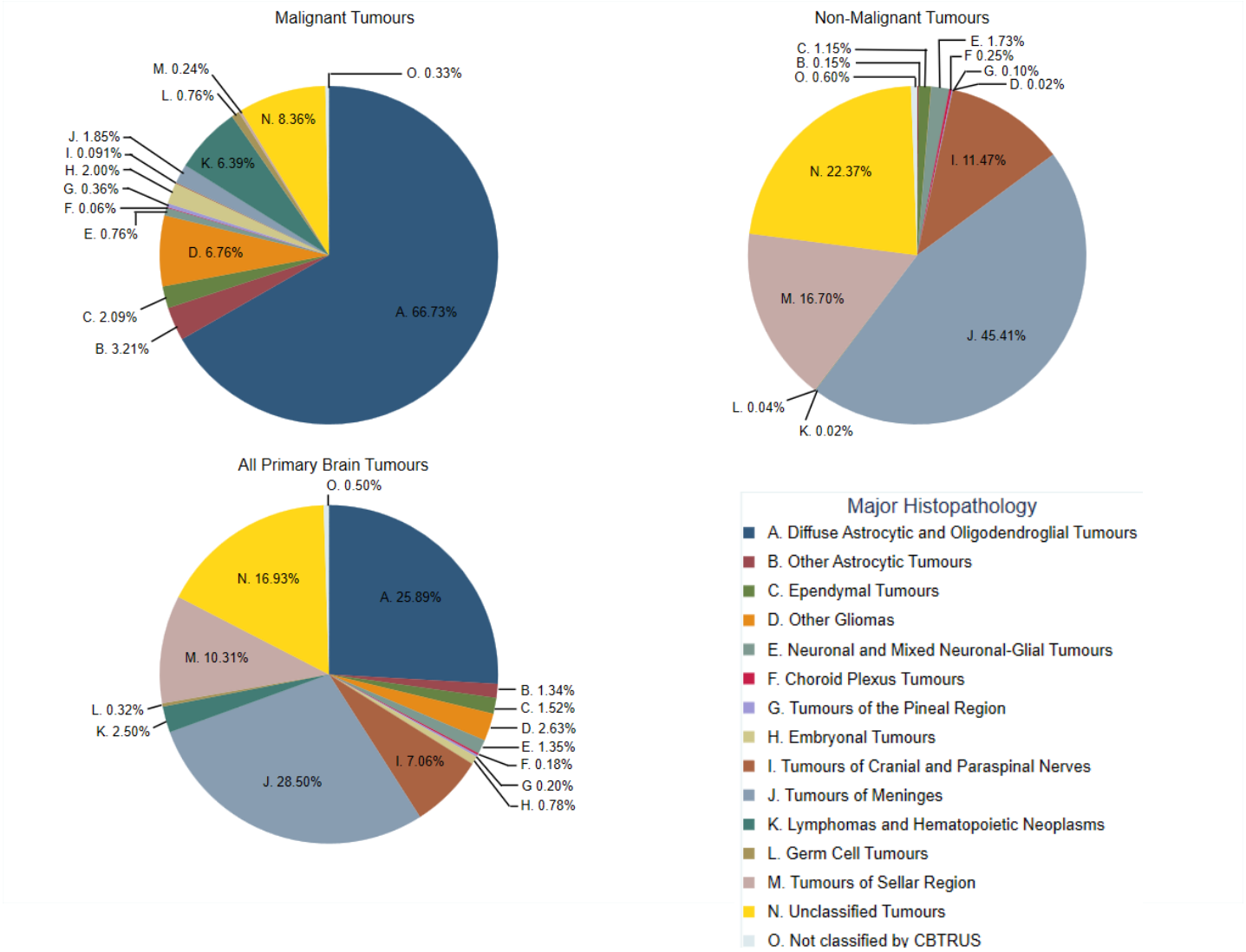
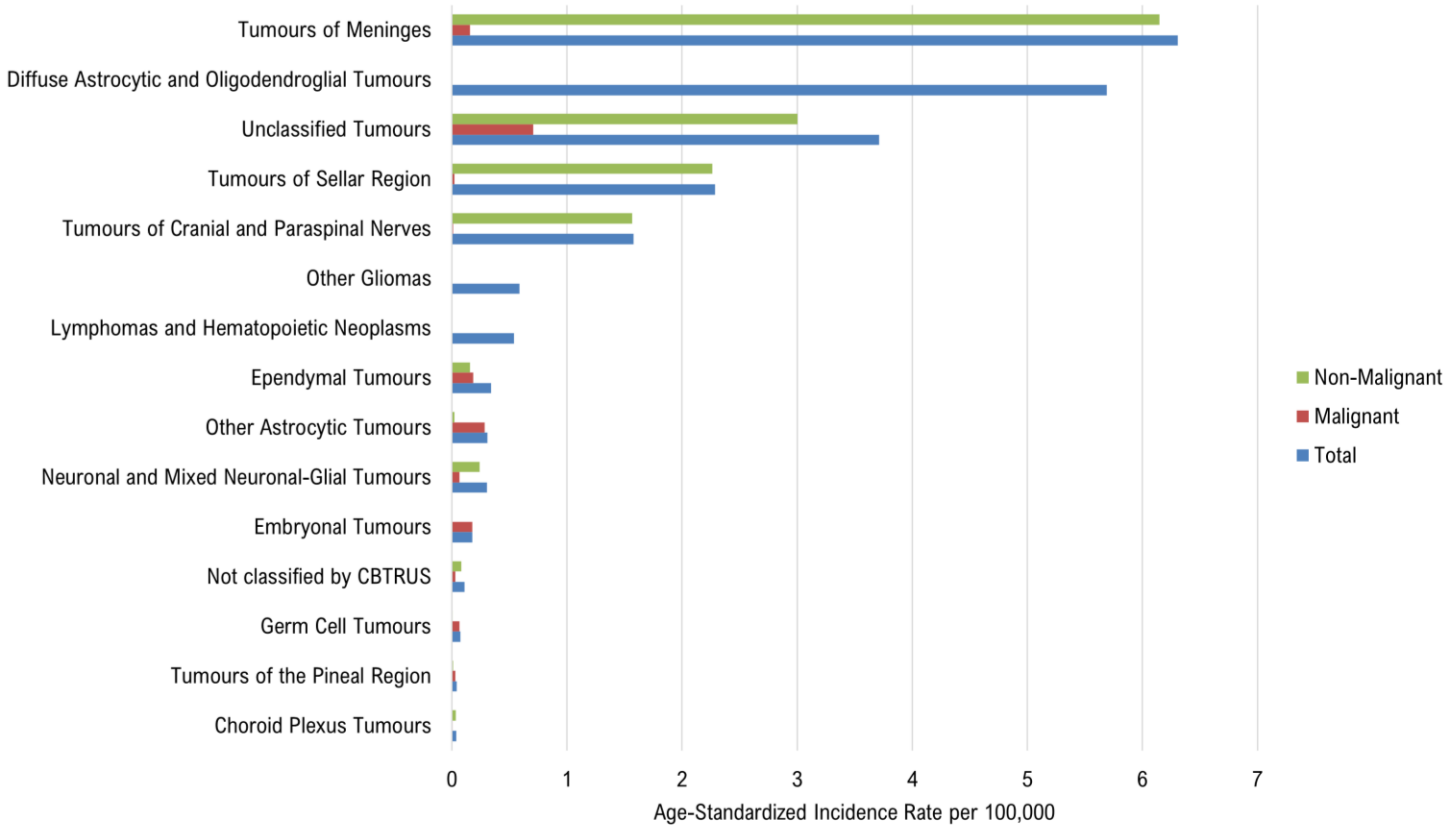


Figure 2: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by behaviour and major histopathology group in Canada (2018-2022)



Age and Sex. The incidence of primary CNS tumours stratified by sex is presented in Tables 5 and 6, while the incidence stratified by age is shown in Tables 7-9. The overall ASIR per 100,000 for all primary CNS tumours was higher in females (23.20, 95% CI: 22.90-23.50) than in males (20.48, 95% CI: 20.19-20.77) (Table 5). At the histopathology level, Diffuse Astrocytic and Oligodendroglial Tumours were most common among males; tumours of the meninges were twice as common among females compared to males (8.43 vs. 4.00 per 100,000). Incidence rates increase with age for most major histopathology and subtypes (Figure 3, Tables 5). In children aged 0-14 years, other Astrocytic Tumours had the highest ASIR of 1.05 per 100,000 (95% CI: 0.93-1.17), followed by embryonal tumours (Table 6). The ASIR for most major primary CNS tumours was similar in both male and female children (Table 6), except for embryonal tumours, where the ASIR in male children was almost double that in female children (ASIR 0.83 vs 0.49 per 100,000) (Table 6).

Figure 2: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by sex and major histopathology group Canada, 2018-2022

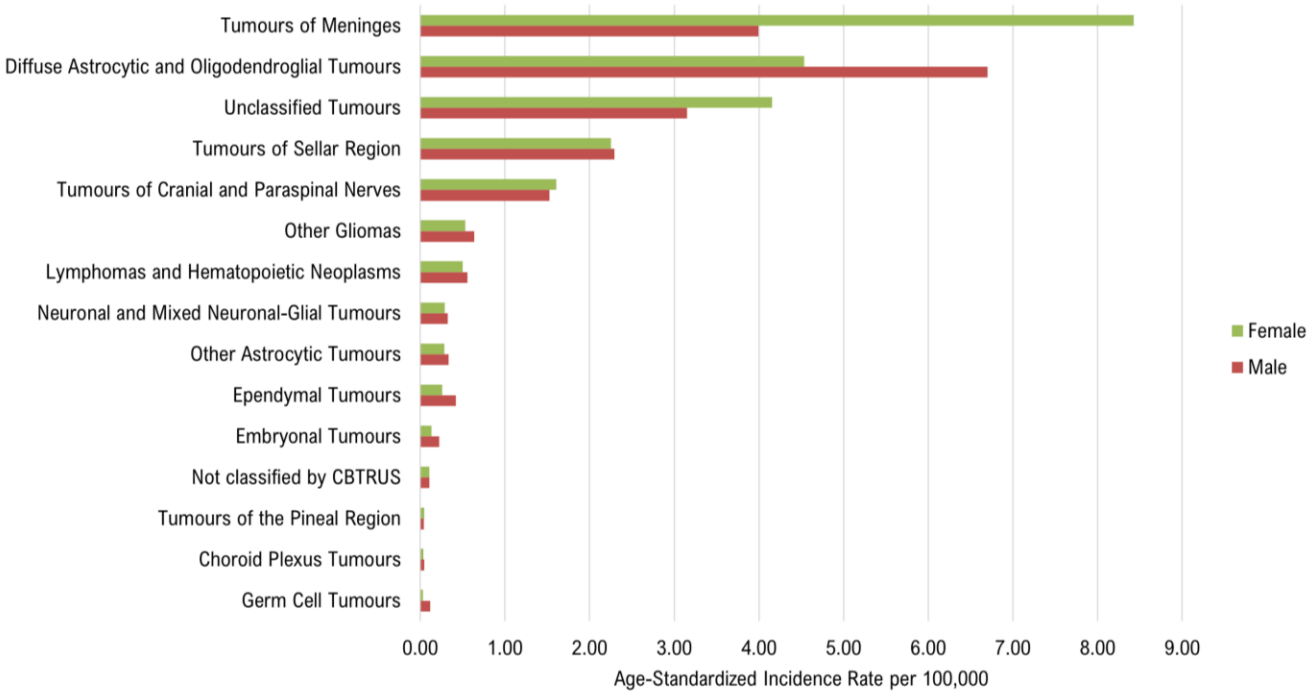
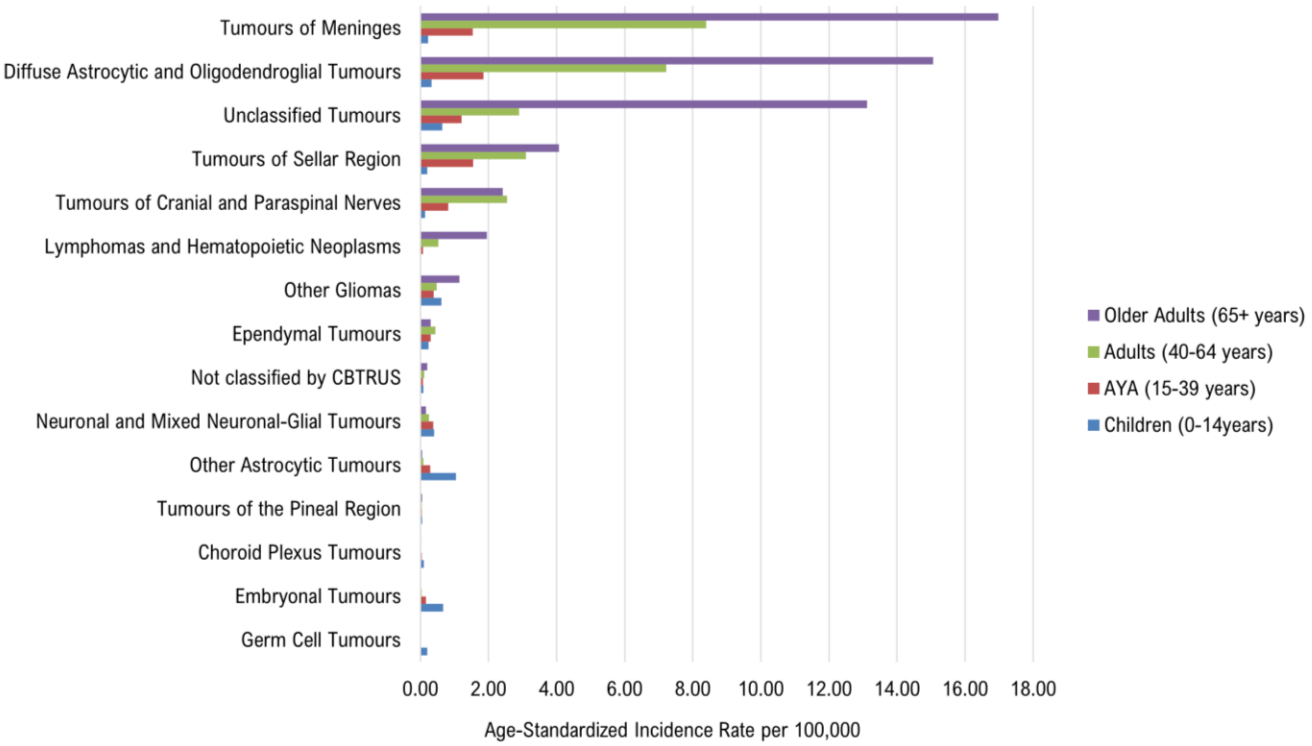


Figure 3: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histopathology and age at diagnosis, Canada, 2018-2022

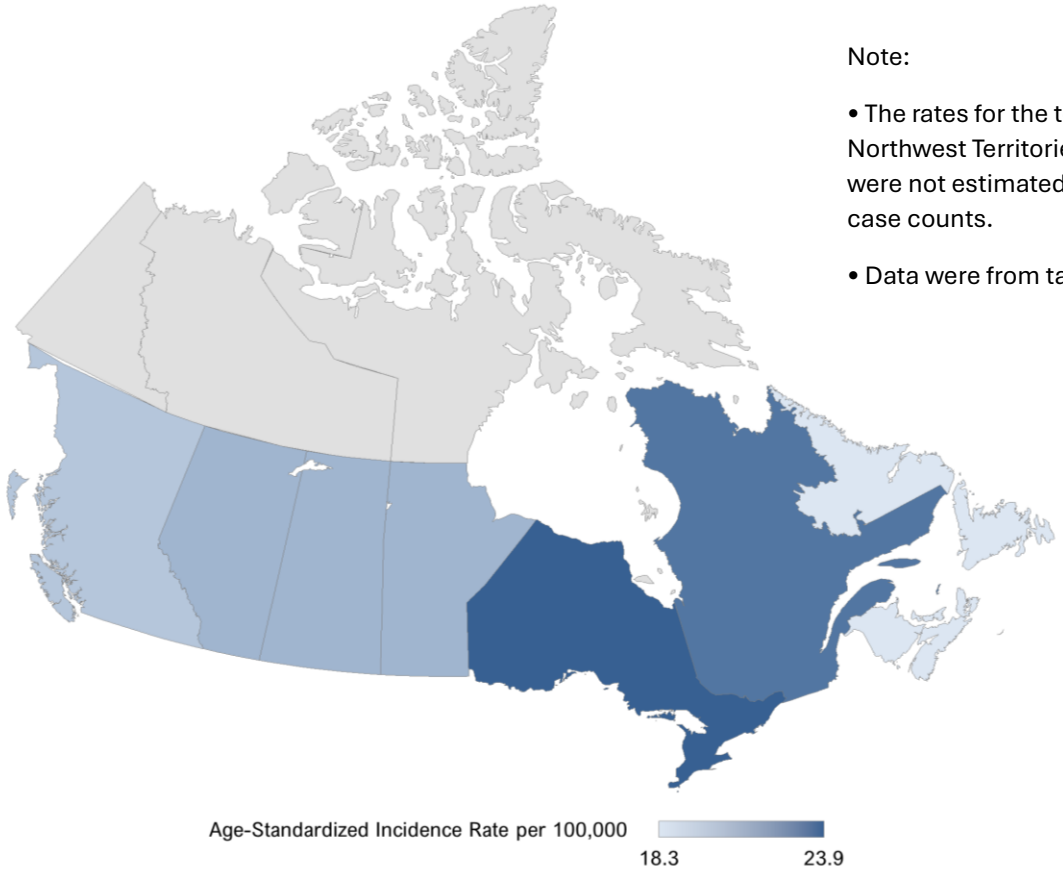


Notes: *Germ Cell Tumours incidence rates were not estimated for AYA, Adults, and Older Adults.*

Geographic distribution.

Data on the geographic distribution of primary CNS tumours is shown in Tables 10-12 and Figures 5-7. Provinces in both the Atlantic regions and the Prairie regions were merged because some provinces recorded very few primary CNS tumours. Reporting them separately would violate the non-disclosure agreement. The ASIR for malignant primary CNS tumours ranged from a low of 7.55 per 100,000 (95% CI: 7.26-7.85) for the Prairie Region to a high of 9.65 per 100,000 (95% CI: 9.12-10.21) for the Atlantic Region, with Quebec recording the second-highest ASIR of 9.29 per 100,000 (95% CI: 9.00-9.58) (Figure 6, Table 11). The ASIR for non-malignant primary CNS tumours ranged from a low of 8.69 per 100,000 (95% CI: 8.18–9.22) for the Atlantic region to a high of 15.47 per 100,000 (95% CI: 15.19–15.76) for Ontario, with the second-highest ASIR of 13.70 per 100,000 (95% CI: 13.35–14.05) for Quebec (Figure 7, Table 12). Overall, Ontario had the highest ASIR for all primary CNS tumours (23.92 per 100,000, 95% CI: 23.57–24.28) (Figure 5, Table 10). Quebec also had a high ASIR and only marginally lower than Ontario (22.99 per 100,000, 95% CI: 22.54-23.45) (Table 10). The lowest ASIR for all primary CNS tumours was observed in the Atlantic region (18.34 per 100,000; 95% CI: 17.60–19.11) (Table 10).

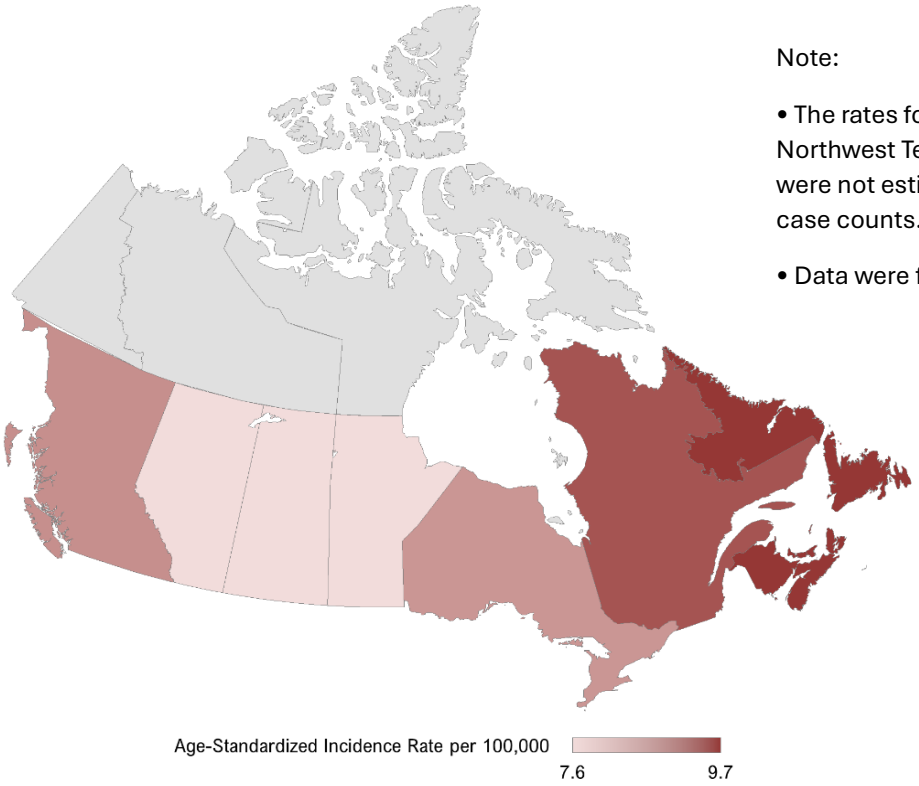
Figure 4: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by Region/Province, Canada, 2018-2022



Note:

- The rates for the territories (Yukon, Northwest Territories, and Nunavut) were not estimated due to small case counts.
- Data were from table 10.

Figure 5: Average annual age-standardized incidence rates (per 100,000) for malignant primary central nervous system tumours by Region/Province, Canada, 2018-2022

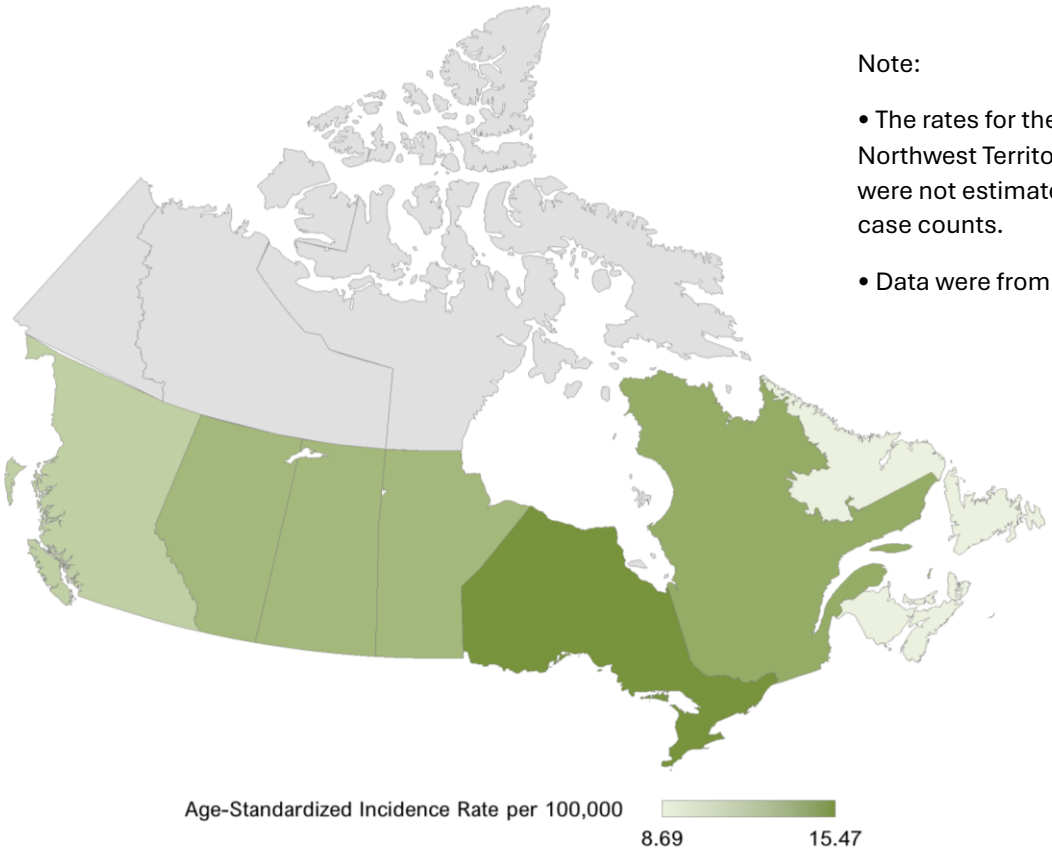


Note:

• The rates for the territories (Yukon, Northwest Territories, and Nunavut) were not estimated due to small case counts.

• Data were from table 11.

Figure 6: Average annual age-standardized incidence rates (per 100,000) for non-malignant primary central nervous system tumours by Region/Province, Canada, 2018-2022



Note:

• The rates for the territories (Yukon, Northwest Territories, and Nunavut) were not estimated due to small case counts.

• Data were from table 12.

Comparison with the United States. Incidence rates standardized to the 2000 U.S. standard population are shown in Tables 1, 13 and 14, incidence rates for the United States are from Central Brain Tumor Registry of the United States (CBTRUS) statistical report. The ASIR for all primary CNS tumours was higher in the United States compared to Canada (U.S.: 26.05 per 100,000 (95% CI: 25.97-26.12); Canada: 18.46 per 100,000 (95% CI: 18.29-18.63)) (Table 1 and 13). By histopathology, the largest absolute difference between Canada and the United States was for tumours of the meninges (U.S.: 10.99 per 100,000 (95% CI: 10.95-11.04); Canada: 5.10 per 100,000 (95% CI: 5.01-5.20)). Conversely, the rate of unclassified tumours was higher in Canada than in the United States (U.S.: 1.02 per 100,000 (95% CI: 1.01-1.04); Canada: 3.03 per 100,000 (95% CI: 2.96-3.11)) (Table 1). By behaviour, rates were similar for all primary malignant CNS tumours, but the Canadian rate for all primary non-malignant CNS tumours is about half of the U.S. incidence rate (Table 1). The ASIR of all primary CNS tumours by major histopathology group were similar in children aged 0-14 years in the United States and Canada, with other astrocytic tumours recording the highest ASIR in both countries, but higher in the United States compared to Canada (1.26 vs. 1.04 per 100,000) (Table 1 and 14). In adolescents and young adults (AYA) aged 15-39 years, tumours of sellar region were the most common primary CNS tumour by major histopathology group in the United States, with an ASIR of 4.78 per 100,000 (95% CI: 4.72-4.84). Conversely, diffuse astrocytic and oligodendroglial tumours had the highest ASIR in the same age group in Canada (1.85 per 100,000; 95% CI: 1.75-1.96), which is higher than the ASIR for diffuse astrocytic and oligodendroglial tumours in the United States (1.76 per 100,000; 95% CI: 1.72-1.79) (Table 14). The overall ASIR for primary malignant CNS tumours was high in AYA and adults aged 40 years and older in Canada (3.24 and 12.58 per 100,000, respectively) compared to the same age groups in the United States (3.16 and 11.60 per 100,000, respectively) (Tables 1 and 14). Additionally, the ASIRs of diffuse astrocytic and oligodendroglial tumours and unclassified tumours were also high in AYA and adults aged 40 years and older in Canada compared to the same age groups in the United States (Table 14). Among adults aged 40 years and older, tumours of meninges were the most common primary CNS tumour by major histopathology group in both Canada and the United States, but they were more than twice as common in the United States compared to Canada (23.51 vs. 10.57 per 100,000) (Table 14).

Incidence Rates over Time. The incidence rates over years are shown in Table 15. Between 2010 and 2022, the ASIR for primary CNS tumours experienced minor fluctuations across GBM, malignant tumours, non-malignant tumours, and all primary CNS tumours. In Canada (excluding Quebec and Nova Scotia), the ASIR for all primary CNS tumours showed a slight overall decrease (24.07 per 100,000 in 2010 to 20.91 per 100,000 in 2022). This drop was largely driven by a decline in the ASIR of non-malignant tumours (15.53 per 100,000 in 2010 to 13.19 per 100,000 in 2022). We note that the registration of new cancer cases in 2020-21 was impacted by disruptions in health services due to COVID. Thus, the incidence rates in these two year could be lower than a normal year.

Looking at the Quebec data from 2010 to 2017, the very low non-malignant ASIR reported in Quebec in 2010 (3.06 per

100,000) could be due to data capture problems, which warrants further investigation. CCR notes that 2011 and 2012 are considered transition years for Quebec and incidences from these two years should not be compared with those of other years.

Discussion

This report provides comprehensive population-level surveillance information on primary central nervous system tumour occurrence in Canada for 2018–2022. The variation in incidence rates based on various characteristics, such as age and sex, in specific tumour types reflects the heterogeneity and complexity of these tumours and draws attention to the importance of routine surveillance reporting.

Histopathological Distribution. The most common histopathological type identified was meningioma, with an ASIR of 5.77 per 100,000, accounting for 26.1% of all CNS tumours and 41.8% of non-malignant tumours. This result is consistent with literature, as meningiomas are well-established as the most frequently diagnosed primary intracranial tumour globally[20]. The predominance of meningiomas among non-malignant CNS tumours reflects both their biological nature and improved detection through advanced neuroimaging techniques[20]. Diffuse astrocytic and oligodendroglial tumours were the second most common group overall, with glioblastoma being the most prevalent malignant histopathology (ASIR: 4.52 per 100,000) (Table 4). Glioblastoma accounted for 20.64% of all CNS tumours and 53.10% of malignant tumours, underscoring its significance as the most common and aggressive primary brain malignancy. This finding aligns with previous Canadian surveillance data and emphasizes the continued clinical burden of this pathology[2,12].

A notable finding was the high proportion of unclassified tumours (ASIR: 3.56 per 100,000), representing 16.25% of all primary CNS tumours. Within Canada, Ontario recorded the highest ASIR for all primary unclassified tumours (7.66 per 100,000 (95% CI: 7.46-7.86)) that far exceeded the rate of these tumours in the remaining provinces/regions, which ranged from 0.55 per 100,000 (95% CI: 0.48-0.63) to 2.16 per 100,000 (95% CI: 2.02-2.30) (Table 10). It is evident that the overall rate of unclassified tumours in Ontario is driven by non-malignant types (ASIR = 6.86 per 100,000, 95% CI: 6.67–7.05) (Table 12). Conversely, the ASIR of malignant unclassified tumours is consistent across provinces and regions (Table 11). While Ontario captures the greatest proportion of expected non-malignant tumours, relative to other provinces/regions, a substantial proportion of those tumours are unclassified. Therefore, aside from improving the overall capture of non-malignant tumours in provincial/regional cancer registries, additional work is needed to ensure consistent and complete classification of these tumours across Canada[8]. The high proportion of unclassified tumours being in Ontario could be due to its registry utilizing non-pathology-proven cases from source data in Canadian Institute for Health Information. While Ontario has this advantage of identifying incident cases that would otherwise be missed, the current data sources do not necessarily provide adequate details for classifying tumour into categories

used in surveillance reports[2]. Providing access to verified sources of data, such as radiological imaging and molecular markers, tailored to the health information structures of each jurisdiction could augment classification and resolve this issue, allowing registries to provide highly clinically relevant information[2].

The unclassified tumours, particularly the specific histopathology type "unspecified neoplasm" subtype, poses challenges for accurate epidemiological surveillance. The high rate of unclassified tumours in Canada compared to the United States suggests potential differences in diagnostic practices, reporting completeness, or access to specialized neuropathological services. Enhanced efforts to classify these tumours according to the WHO Classification of Tumours of the Central Nervous System could improve both patient care and surveillance accuracy[7,17,21].

Age and Sex Patterns. The overall ASIR was higher in females (23.20 per 100,000) than males (20.48 per 100,000), driven primarily by the twofold higher incidence of meningiomas in females compared to males (8.43 vs. 4.00 per 100,000) (Table 5). This sex disparity in meningioma incidence is well-documented and has been attributed to hormonal factors, with estrogen and progesterone receptors commonly expressed in meningioma tissue[20]. Conversely, males had a higher ASIR for all other primary CNS tumours compared to females which is consistent with established patterns in glioma epidemiology[2,18].

Incidence rates increased with age for most major histopathological types, reflecting the general trend of increased tumour risk with aging. In children aged 0-14 years, other astrocytic tumours had the highest ASIR (1.05 per 100,000), followed by embryonal tumours. Notably, embryonal tumours showed a marked sex disparity in children, with rates in males nearly double those in females (0.83 vs. 0.49 per 100,000) (Table 6). This pattern has been consistently observed in pediatric brain tumour epidemiology and warrants further investigation into potential biological mechanisms[18,22].

Geographic Variation. Substantial geographic variation in CNS tumour incidence was observed across Canadian regions. Ontario recorded the highest ASIR for all primary CNS tumours (23.92 per 100,000), while the Atlantic region had the lowest (18.34 per 100,000). For malignant tumours, rates ranged from the lowest (7.55 per 100,000) in the Prairie region to the highest (9.65 per 100,000) in the Atlantic region. The geographic variation was even more pronounced for non-malignant tumours, ranging from 8.69 per 100,000 in the Atlantic region to 15.47 per 100,000 in Ontario (Table 12).

Quebec ranked second highest in ASIR for malignant, non-malignant and overall primary CNS tumours in Canada. (Table 10-12). Note that due to data availability, rates in Quebec were derived from cases identified from 2013 to 2017 instead of 2018 to 2022 for other provinces, under the assumption that these rates would remain steady.

These geographic disparities likely reflect multiple factors, including differences in case ascertainment practices, access to advanced neuroimaging, genetic makeup, and the completeness of non-malignant tumour reporting to provincial cancer registries. Previous research has documented challenges in achieving complete case ascertainment of non-malignant CNS tumours in Canada, particularly in jurisdictions that have not fully implemented discharge abstract

database linkage for case finding, which has been shown to improve ascertainment rate in Manitoba, Alberta, British Columbia and Ontario[3,13,23]. The lower rates of non-malignant tumours in some regions likely indicate incomplete case capture rather than true differences in disease occurrence, highlighting the need for continued improvement in surveillance infrastructure across all provinces and territories.

Quebec Data. This is the first time Quebec data was included in the CNS surveillance report. For this report, Quebec data from 2013 to 2017 was used and the rate of 2018-22 is assumed to remain the same.

We compared the incident rate in Quebec to our previously reported Canadian incident rate excluding Quebec, which covered the same 2013–2017 timeframe. In our previous report[8], the ASIRs for Canada (excluding Quebec) were 21.05 (95% CI: 20.81–21.29) for all primary CNS tumours, 7.93 (95% CI: 7.78–8.08) for malignant tumours, and 13.12 (95% CI: 12.93–13.31) per 100,000 for non-malignant tumours (Table 4[8]). Quebec's ASIRs during that same period were notably higher: 22.99 (95% CI: 22.54–23.45), 9.29 (95% CI: 9.00–9.58), and 13.70 (95% CI: 13.36–14.06) per 100,000, respectively (Tables 10-12). The discrepancy suggests that previous national ASIRs, which relied on data excluding Quebec, underestimated the true national incidence.

Quebec had notable fluctuations in non-malignant tumours captured between 2010 and 2012, recording ASIRs of as low as 3.06 (95% CI: 2.67–3.46) and as high as 25.10 (95% CI: 23.99–26.25) per 100,000. This observation is consistent with CCR's cautionary note on Quebec data quality in 2011 and 2012.

Since 2013, the ASIRs of non-malignant tumours fell in a relatively narrow range of 13.25 to 17.59 per 100,000 (Table 15). Despite the fluctuations, the ASIRs indicates overall better capture of non-malignant tumours in Quebec comparing to other regions in Canada, except Ontario.

Quebec's overall ASIR for unclassified tumour group was 2.16 (95% CI: 2.02-2.30). Although this is notably lower than the Canadian average of 3.71 (95% CI: 3.62-3.80), the high national average was primarily driven upward by Ontario (Tables 4, 10-12). When comparing specific tumour behaviors in this classification group, Quebec had a higher ASIR for malignant tumours (1.14 vs. 0.71) (Table 4, 10-12). Furthermore, when comparing Quebec to other specific regions, Quebec's unclassified tumour rates were consistently higher than those in the Atlantic region, British Columbia, and the Prairie region for both malignant and non-malignant tumours.

Comparison with the United States. When standardized to the 2000 U.S. standard population for comparison, the ASIR for all primary CNS tumours was substantially lower in Canada (18.46 per 100,000) than in the United States (26.05 per 100,000)[18]. The difference was primarily driven by non-malignant tumours, where the Canadian rate was approximately half the U.S. rate. This finding underscore the challenges documented in previous Canadian studies regarding the completeness of non-malignant CNS tumour registration[3,26].

The overall ASIR for primary malignant CNS tumours was high in adolescents and young adults (AYA) and adults 40+ years old in Canada compared to the same age groups in the United States. (Table 14) These variations in incidences may be due to differences in

registry completeness and tumour coding practices between Canada and the United States. Differences in the classification of CNS tumours with borderline or uncertain behaviour could be a source of variability in malignant incidence rates between Canada and the United States. In Canada, provincial tumour registries contributing to the Canadian Cancer Registry (CCR) have applied inconsistent rules regarding whether such tumours are captured as malignant or non-malignant, with marked interprovincial variation in the proportion of unclassified non-malignant CNS tumours[2,10,24,25].

Canada had a higher rate of overall unclassified tumours (3.03 per 100,000) compared to the United States (1.02 per 100,000), largely attributed to primary non-malignant CNS tumours[18]. The difference appears to be largely driven by Ontario's high rate of unclassified non-malignant CNS tumours, suggesting potential differences in diagnostic coding or reporting practices. While progress has been made through the implementation of discharge abstract database linkage in several provinces, further improvements in case ascertainment are needed to achieve completeness comparable to the United States Central Brain Tumor Registry (CBTRUS)[14,18,23,27].

Strengths and Limitations. This study has several important strengths. It represents the most current and comprehensive population-based data on CNS tumour incidence in Canada, utilizing data from all provincial cancer registries and the first-time incorporating data from Quebec. The use of standardized classification systems aligned with international standards (ICD-O-3 and WHO 2016 Classification) facilitates comparisons with other jurisdictions[16,17]. However, some limitations must be acknowledged. First, as noted throughout this report, the ascertainment of non-malignant CNS tumours remains incomplete in Canada[13,23]. Not all provinces have fully implemented discharge abstract database linkage for identifying non-malignant cases, leading to underestimation of the true incidence of these tumours[13,23]. The data from Quebec (2013-2017) and Nova Scotia (2015-2019) were assumed to be stable and used to compute the 2018-2022 period, which may introduce some temporal misalignment.

Implications for Surveillance and Future Directions. These findings have several important implications for CNS tumour surveillance in Canada. There is a need for continued efforts to improve the completeness of non-malignant CNS tumour ascertainment across all provinces. The successful implementation of discharge abstract database linkage in some jurisdictions provides a model that could be expanded[14,23]. Additionally, efforts should be made to reduce the proportion of unclassified tumours through improved access to specialized neuropathological services and molecular diagnostics. The 2021 WHO Classification of Tumours of the Central Nervous System incorporated molecular parameters into diagnostic criteria, and future surveillance efforts should aim to capture these important characteristics[13,21].

The geographic variation in incidence rates warrants further investigation to distinguish true epidemiological differences from artifacts of surveillance methodology. Collaborative efforts such as the BTSRC provide valuable frameworks for enhancing CNS tumour surveillance and research[2,23]. Finally, continued monitoring of temporal trends will be essential for detecting changes in CNS tumour incidence and evaluating the impact of evolving diagnostic technologies,

treatment patterns, and potential environmental or lifestyle risk factors[2,18].

Conclusion

This report of primary central nervous system tumours diagnosed in Canada in 2018–2022 comprehensively describes the population-based incidence of primary CNS tumours collected by all Canadian cancer registries, covering the Canadian population. The detailed data provided on the distribution and incidence of CNS tumours among Canadians will support the work of the neuro-oncology community and provide a baseline for ongoing surveillance. It would also serve as a useful resource for researchers, clinicians and patients.

The findings were consistent with the expected frequency and distribution of primary CNS tumours in Canada and comparable to those reported in the US. Reporting delay and incomplete case ascertainment of non-malignant CNS tumours contribute to the underestimates of burden of primary CNS tumours in Canada and compromise the accurate interpretation of surveillance statistics. Further, the high frequency of unclassified tumours indicates the need to improve the consistency and completeness of information across provinces. The potential underreporting of non-malignant cases and the higher-than-expected proportion of unclassified cases will affect the accuracy of histopathology-specific information, particularly for tumour groups with mixed behaviours. However, a portion of unclassified tumours are truly unclassified, so further assessment of the factors underlying this labelling is warranted. We emphasize the need to provide support for region-specific approaches for case identification and tumour-specific coding.

By making these estimates available, we envisage that provincial stakeholders and cancer registries will collaborate to address these and improve the accuracy of these data over time. The BTSRC is committed to data quality improvement initiatives throughout the country.

Tables

Table 1: Age-standardized incidence rate (per 100,000 using the 2000 US standard population) for all primary central nervous system tumours by tumour behaviour, age at diagnosis.

	Canada	United States
	Rate (95% CI)	**Rate (95% CI)**
Tumour Behaviour		
Malignant	7.17 (7.08-7.28)	6.86 (6.82-6.90)
Non-malignant	11.29 (11.16-11.42)	19.19 (19.12-19.25)
Total	**18.46 (18.29-18.63)**	**26.05 (25.97-26.12)**
Age at Diagnosis		
Children (aged 0-14 years)		
Malignant	3.21 (3.01-3.42)	3.48 (3.41-3.55)
Non-Malignant	1.74 (1.59-1.89)	2.03 (1.98-2.08)
Total	**4.95 (4.70-5.21)**	**5.51 (5.42-5.59)**
AYA (aged 15-39 years)		
Malignant	3.24 (3.10-3.39)	3.16 (3.11-3.21)
Non-Malignant	5.66 (5.47-5.85)	9.16 (9.07-9.24)
Total	**8.90 (8.67-9.14)**	**12.31 (12.22-12.41)**
Adults (aged 40+ years)		
Malignant	12.58 (12.36-12.80)	11.6 (11.53-11.68)
Non-Malignant	21.09 (20.80-21.38)	36.02 (35.89-36.15)
Total	**33.67 (33.31-34.03)**	**47.62 (47.47-47.78)**

Table 2: Total cases, percent distribution, and median age for all primary central nervous system tumours by Histopathology group, Canada, 2018-2022.

Histopathology group[a] (**major**/specific)	Total cases	Percent of all CNS tumours	Median age	Total Malignant cases	Percent Malignant
Diffuse Astrocytic and Oligodendroglial Tumours	**11,010**	**25.91**	**63**	-[b]	-[b]
Diffuse astrocytoma	865	2.04	43	-[b]	-[b]
Anaplastic astrocytoma	565	1.33	50	565	100
Glioblastoma	8,770	20.64	66	8,770	100
Oligodendroglioma	450	1.06	43	450	100
Anaplastic oligodendroglioma	285	0.67	48	285	100
Oligoastrocytic tumours	80	0.19	49.5	80	100
Other Astrocytic Tumours	**570**	**1.34**	**12**	**530**	**92.98**
Pilocytic astrocytoma	500	1.18	11	500	100
Unique astrocytoma variants	70	0.16	18	35	50
Ependymal Tumours	645	1.52	45	345	53.49
Other Gliomas	**1,120**	**2.64**	**52**	**1,115**	**99.55**
Glioma malignant, NOS	1,110	2.61	52	1,110	100
Other neuroepithelial tumours	10	0.02	35	5	50
Neuronal and Mixed Neuronal-Glial Tumours	**575**	**1.35**	**31**	**125**	**21.74**
Choroid Plexus Tumours	**75**	**0.18**	**20.5**	**10**	**13.33**
Tumours of the Pineal Region	**85**	**0.2**	**39**	**60**	**70.59**
Embryonal Tumours	**330**	**0.78**	**10**	**330**	**100**
Tumours of Cranial and Paraspinal Nerves	**3,000**	**7.06**	**56**	**15**	**0.5**
Tumours of Meninges	**12,120**	**28.52**	**64**	**305**	**2.52**
Meningioma	11,090	26.09	64	225	2.03
Mesenchymal tumours	1,005	2.36	53	60	5.97
Primary melanocytic lesions	25	0.06	54	20	80
Lymphomas and Hematopoietic Neoplasms	**1,060**	**2.49**	**68**	**1,055**	**99.53**
Germ Cell Tumours	**135**	**0.32**	**16**	**125**	**92.59**
Tumours of Sellar Region	**4,385**	**10.32**	**56**	**40**	**0.91**
Tumours of the pituitary	4,085	9.61	56	40	0.98
Craniopharyngioma	300	0.71	51	0	0
Unclassified Tumours	**7,200**	**16.94**	**71**	**1,380**	**19.17**
Hemangioma	255	0.6	52	0	0
Neoplasm, unspecified	6,905	16.25	72	1,370	19.84
All other	35	0.08	39	5	14.29
Not classified by CBTRUS	**210**	**0.49**	**55.5**	**55**	**26.19**
Total	**42,500**	**100**	**62**	**16,505**	**38.84**

Notes: Columns may not sum to totals due to rounding.

[a]Defined as per the Central Brain Tumour Registry of the United States.

[b]Values not available due to non-disclosure agreement.

Percent of all CNS tumours

Low — High

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; NOS = not otherwise specified; CI = confidence interval.

Table 3: Total cases and average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by tumour site, Canada, 2018-2022.

Site (ICD-O-3 Topography Code)	Total cases	Rate	95% CI
Brain (C71)	19,170	9.94	9.80-1.09
Cerebrum (C71.0)	1,355	0.71	0.67-0.74
Frontal lobe (C71.1)	4,615	2.39	2.32-2.46
Temporal lobe (C71.2)	3,335	1.72	1.67-1.78
Parietal lobe (C71.3)	1,860	0.96	0.92-1.00
Occipital lobe (C71.4)	490	0.25	0.23-0.28
Ventricle, NOS (C71.5)	420	0.22	0.20-0.24
Cerebellum, NOS (C71.6)	1,115	0.59	0.56-0.63
Brain stem (C71.7)	690	0.37	0.34-0.40
Overlapping lesion of brain (C71.8)	1,605	0.82	0.78-0.87
Brain, NOS (C71.9)	3,680	1.91	1.85-1.97
Spinal cord and cauda equina (C72.0-C72.1)	1,530	0.80	0.76-0.85
Spinal cord (C72.0)	1,470	0.77	0.73-0.81
Cauda equina (C72.1)	60	0.031	0.024-0.040
Cranial nerves (C72.2-C72.5)	2,310	1.21	1.17-1.27
Olfactory nerve (C72.2)	5	0.004	0.002-0.008
Optic nerve (C72.3)	110	0.060	0.049-0.073
Acoustic nerve (C72.4)	1,585	0.84	0.80-0.88
Cranial nerve, NOS (C72.5)	605	0.31	0.29-0.34
Other nervous system (C72.8-C72.9)	225	0.118	0.103-0.135
Overlapping lesion of brain and CNS (C72.8)	35	0.018	0.012-0.025
Nervous system, NOS (C72.9)	190	0.100	0.086-0.116
Meninges (C70)	13,085	6.79	6.67-6.91
Cerebral meninges (C70.0)	10,790	5.61	5.50-5.72
Spinal meninges (C70.1)	865	0.44	0.42-0.48
Meninges, NOS (C70.9)	1,430	0.73	0.70-0.77
Pituitary and craniopharyngeal duct (C75.1-C75.2)	5,865	3.06	2.98-3.13
Pituitary gland (C75.1)	5,600	2.92	2.84-2.99
Craniopharyngeal duct (C75.2)	265	0.140	0.124-0.158
Pineal gland (C75.3)	240	0.126	0.111-0.143
Nasal cavity (C30.0)[a]	80	0.043	0.034-0.053
Total	**42,500**	**22.09**	**21.88-22.31**

Notes: Rates are age-standardized to the 2016 Canadian standard population.
Columns may not sum to total due to rounding.
[a]Limited to ICD-O-3 histopathology codes 9522-9523.
Data Source: Canadian Cancer Registry at Statistics Canada.
Abbreviations: NOS = not otherwise specified; CI = confidence interval.

Table 4: Total cases and average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histopathology group and behavior, Canada, 2018-2022.

	Total			Malignant			Non-malignant		
Histopathology[a] (**major**/specific)	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**11,010**	**5.69**	**5.58-5.80**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Diffuse astrocytoma	865	0.45	0.42-0.48	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Anaplastic astrocytoma	565	0.29	0.27-0.32	565	0.29	0.27-0.32	0	0	0
Glioblastoma	8,770	4.52	4.42-4.62	8,770	4.52	4.42-4.62	0	0	0
Oligodendroglioma	450	0.24	0.21-0.26	450	0.24	0.21-0.26	0	0	0
Anaplastic oligodendroglioma	285	0.15	0.13-0.17	285	0.15	0.13-0.17	0	0	0
Oligoastrocytic tumours	80	0.041	0.032-0.051	80	0.041	0.032-0.051	0	0	0
Other Astrocytic Tumours	**570**	**0.31**	**0.28-0.33**	**530**	**0.29**	**0.26-0.31**	**40**	**0.021**	**0.015-0.029**
Pilocytic astrocytoma	500	0.27	0.25-0.29	500	0.27	0.25-0.29	0	0	0
Unique astrocytoma variants	70	0.039	0.031-0.049	35	0.018	0.013-0.025	40	0.021	0.015-0.029
Ependymal Tumours	**645**	**0.34**	**0.31-0.37**	**345**	**0.18**	**0.16-0.20**	**295**	**0.16**	**0.14-0.18**
Other Gliomas	**1,120**	**0.59**	**0.55-0.62**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Glioma malignant, NOS	1,110	0.58	0.55-0.62	1,110	0.58	0.55-0.62	0	0	0
Other neuroepithelial tumours	10	0.005	0.002-0.009	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Neuronal and Mixed Neuronal-Glial Tumours	**575**	**0.30**	**0.28-0.33**	**125**	**0.065**	**0.054-0.078**	**450**	**0.24**	**0.22-0.26**
Choroid Plexus Tumours	**75**	**0.040**	**0.031-0.050**	**10**	**0.005**	**0.0023-0.0096**	**65**	**0.035**	**0.027-0.045**
Tumours of the Pineal Region	**85**	**0.044**	**0.035-0.054**	**60**	**0.031**	**0.024-0.041**	**25**	**0.012**	**0.008-0.019**
Embryonal Tumours	**330**	**0.18**	**0.16-0.20**	**330**	**0.18**	**0.16-0.20**	**0**	**0**	**0**
Tumours of Cranial and Paraspinal Nerves	**3,000**	**1.58**	**1.52-1.64**	**15**	**0.010**	**0.006-0.016**	**2,980**	**1.57**	**1.51-1.63**
Tumours of Meninges	**12,120**	**6.31**	**6.19-6.42**	**305**	**0.16**	**0.14-0.18**	**11,815**	**6.15**	**6.04-6.26**
Meningioma	11,090	5.77	5.66-5.87	225	0.12	0.1.-0.13	10,860	5.65	5.54-5.76
Mesenchymal tumours	1,005	0.53	0.50-0.56	60	0.031	0.023-0.040	945	0.50	0.47-0.53
Primary melanocytic lesions	25	0.013	0.009-0.020	20	0.010	0.006-0.016	5	0.003	0.001-0.007
Lymphomas and Hematopoietic Neoplasms	**1,060**	**0.54**	**0.51-0.57**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Germ Cell Tumours	**135**	**0.074**	**0.062-0.088**	**125**	**0.068**	**0.056-0.081**	**10**	**0.007**	**0.003-0.011**
Tumours of Sellar Region	**4,385**	**2.29**	**2.22-2.36**	**40**	**0.021**	**0.015-0.029**	**4,345**	**2.26**	**2.20-2.33**
Tumours of the pituitary	4,085	2.13	2.06-2.20	40	0.021	0.015-0.029	4,045	2.11	2.04-2.17
Craniopharyngioma	300	0.16	0.14-0.18	0	0	0	300	0.16	0.14-0.18
Unclassified Tumours	**7,200**	**3.71**	**3.62-3.80**	**1,380**	**0.71**	**0.67-0.75**	**5,815**	**3.00**	**2.93-3.08**
Hemangioma	255	0.13	0.12-0.15	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Neoplasm, unspecified	6,905	3.56	3.47-3.64	1,370	0.702	0.67-0.74	5,535	2.85	2.78-2.93
All other	35	0.019	0.01-0.03	5	0.005	0.002-0.009	25	0.014	0.009-0.021
Not classified by CBTRUS	**210**	**0.11**	**0.10-0.13**	**55**	**0.028**	**0.021-0.037**	**155**	**0.081**	**0.069-0.095**
Total	**42,500**	**22.09**	**21.88-22.31**	**16,505**	**8.56**	**8.42-8.69**	**25,995**	**13.54**	**13.38-13.71**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Columns and rows may not sum to totals due to rounding.

[a]Defined as per the Central Brain Tumour Registry of the United States.

[b]Values not available due to non-disclosure agreement.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; NOS = not otherwise specified; CI = confidence interval

Table 5: Total cases and average annual age-standardized incidence rate (per 100,000) for all primary central nervous system tumours by histopathology group and sex, Canada, 2018-2022.

Histopathology[a] (major/specific)	Total			Male			Female		
	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**11,010**	**5.69**	**5.58-5.80**	**6,520**	**6.70**	**6.54-6.87**	**4,490**	**4.54**	**4.40-4.46**
Diffuse astrocytoma	865	0.45	0.42-0.48	480	0.50	0.46-0.55	385	0.40	0.36-0.44
Anaplastic astrocytoma	565	0.29	0.27-0.32	320	0.34	0.30-0.37	245	0.25	0.22-0.28
Glioblastoma	8,770	4.52	4.42-4.62	5,255	5.38	5.23-5.53	3,510	3.52	3.40-3.64
Oligodendroglioma	450	0.24	0.21-0.26	255	0.27	0.24-0.30	195	0.20	0.18-0.23
Anaplastic oligodendroglioma	285	0.151	0.134-0.170	160	0.169	0.143-0.198	130	0.133	0.111-0.159
Oligoastrocytic tumours	80	0.041	0.032-0.051	45	0.049	0.036-0.066	30	0.032	0.022-0.046
Other Astrocytic Tumours	**570**	**0.31**	**0.28-0.33**	**305**	**0.33**	**0.30-0.37**	**265**	**0.28**	**0.25-0.32**
Pilocytic astrocytoma	500	0.27	0.25-0.29	255	0.28	0.25-0.32	240	0.26	0.23-0.29
Unique astrocytoma variants	70	0.039	0.031-0.049	45	0.052	0.038-0.069	25	0.028	0.018-0.041
Ependymal Tumours	**645**	**0.34**	**0.31-0.37**	**400**	**0.42**	**0.38-0.47**	**245**	**0.26**	**0.23-0.29**
Other Gliomas	**1,120**	**0.59**	**0.55-0.62**	**610**	**0.64**	**0.59-0.69**	**510**	**0.53**	**0.48-0.58**
Glioma malignant, NOS	1,110	0.58	0.55-0.62	605	0.64	0.59-0.69	505	0.52	0.48-0.57
Other neuroepithelial tumours	10	0.005	0.002-0.009	_[b]	_[b]	_[b]	_[b]	_[b]	_[b]
Neuronal and Mixed Neuronal-Glial Tumours	**575**	**0.30**	**0.28-0.33**	**305**	**0.32**	**0.29-0.36**	**270**	**0.29**	**0.25-0.32**
Choroid Plexus Tumours	**75**	**0.040**	**0.031-0.050**	**40**	**0.045**	**0.032-0.061**	**30**	**0.035**	**0.024-0.050**
Tumours of the Pineal Region	**85**	**0.044**	**0.035-0.054**	**40**	**0.041**	**0.029-0.056**	**45**	**0.046**	**0.034-0.062**
Embryonal Tumours	**330**	**0.18**	**0.16-0.20**	**200**	**0.22**	**0.20-0.26**	**125**	**0.13**	**0.11-0.16**
Tumours of Cranial and Paraspinal Nerves	**3,000**	**1.58**	**1.52-1.64**	**1,455**	**1.53**	**1.45-1.61**	**1,540**	**1.61**	**1.53-1.69**
Tumours of Meninges	**12,120**	**6.31**	**6.19-6.42**	**3,885**	**4.00**	**3.87-4.12**	**8,230**	**8.43**	**8.24-8.61**
Meningioma	11,090	5.77	5.66-5.87	3,330	3.41	3.29-3.53	7,765	7.94	7.76-8.12
Mesenchymal tumours	1,005	0.53	0.50-0.56	550	0.58	0.53-0.63	455	0.47	0.43-0.52
Primary melanocytic lesions	25	0.013	0.009-0.020	10	0.009	0.004-0.017	15	0.018	0.011-0.029
Lymphomas and Hematopoietic Neoplasms	**1,060**	**0.54**	**0.51-0.57**	**555**	**0.56**	**0.51-0.61**	**500**	**0.50**	**0.46-0.55**
Germ Cell Tumours	**135**	**0.074**	**0.062-0.088**	**105**	**0.119**	**0.097-0.143**	**30**	**0.033**	**0.022-0.047**
Tumours of Sellar Region	**4,385**	**2.29**	**2.22-2.36**	**2,205**	**2.29**	**2.20-2.39**	**2,175**	**2.25**	**2.16-2.35**
Tumours of the pituitary	4,085	2.13	2.06-2.20	2,050	2.12	2.03-2.22	2,040	2.11	2.02-2.20
Craniopharyngioma	300	0.16	0.14-0.18	160	0.17	0.14-0.20	140	0.14	0.12-0.17
Unclassified Tumours	**7,200**	**3.71**	**3.62-3.80**	**3,090**	**3.15**	**3.04-3.26**	**4,105**	**4.16**	**4.03-4.29**
Hemangioma	255	0.13	0.12-0.15	120	0.13	0.11-0.15	130	0.14	0.12-0.17
Neoplasm, unspecified	6,905	3.56	3.47-3.64	2,950	3.00	2.89-3.11	3,955	4.00	3.87-4.13
All other	35	0.019	0.013-0.027	20	0.019	0.011-0.031	20	0.019	0.011-0.030
Not classified by CBTRUS	**210**	**0.110**	**0.095-0.126**	**105**	**0.109**	**0.089-0.132**	**105**	**0.109**	**0.089-0.133**
Total	**42,500**	**22.09**	**21.88-22.31**	**19,825**	**20.48**	**20.19-20.77**	**22,675**	**23.20**	**22.90-23.50**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Columns and rows may not sum to totals due to rounding.

[a]Defined as per the Central Brain Tumour Registry of the United States.

[b]Values not available due to non-disclosure agreement.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; NOS = not otherwise specified; CI = confidence interval.

Table 6: Total cases and average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours in children (aged 0-14 years) by histopathology groups and sex, Canada, 2018-2022.

Histopathology[a] (**major**/specific)	Total (0-14 years)			Male (0-14 years)			Female (0-14 years)		
	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**100**	**0.32**	**0.26-0.39**	**60**	**0.38**	**0.29-0.49**	**40**	**0.26**	**0.19-0.36**
Glioblastoma	55	0.18	0.14-0.24	35	0.22	0.16-0.31	20	0.14	**0.09-0.22**
Other diffuse astrocytic and oligodendroglial tumours	40	0.14	0.10-0.19	25	0.15	0.10-0.23	20	0.12	**0.07-0.19**
Other Astrocytic Tumours	**315**	**1.05**	**0.93-1.17**	**160**	**1.02**	**0.87-1.19**	**160**	**1.07**	**0.91-1.25**
Pilocytic astrocytoma	290	0.96	0.86-1.08	140	0.92	0.77-1.08	150	1.01	**0.86-1.19**
Unique astrocytoma variants	25	0.082	0.053-0.122	15	0.103	0.059-0.167	5	0.061	**0.028-0.116**
Ependymal Tumours	**75**	**0.24**	**0.19-0.30**	**50**	**0.32**	**0.23-0.42**	**25**	**0.16**	**0.10-0.24**
Other Gliomas	**185**	**0.62**	**0.53-0.71**	**90**	**0.59**	**0.47-0.72**	**95**	**0.65**	**0.53-0.80**
Neuronal and Mixed Neuronal-Glial Tumours	**120**	**0.40**	**0.34-0.48**	**70**	**0.44**	**0.34-0.55**	**55**	**0.37**	**0.28-0.48**
Choroid Plexus Tumours	**30**	**0.098**	**0.065-0.140**	**20**	**0.13**	**0.08-0.20**	**10**	**0.062**	**0.028-0.117**
Tumours of the Pineal Region	**15**	**0.056**	**0.033-0.090**	**10**	**0.070**	**0.035-0.126**	**5**	**0.041**	**0.015-0.089**
Embryonal Tumours	**200**	**0.67**	**0.58-0.77**	**130**	**0.83**	**0.70-0.99**	**75**	**0.49**	**0.38-0.62**
Tumours of Cranial and Paraspinal Nerves	**40**	**0.14**	**0.10-0.18**	**20**	**0.14**	**0.09-0.21**	**20**	**0.129**	**0.077-0.202**
Tumours of Meninges	**70**	**0.23**	**0.18-0.29**	**35**	**0.23**	**0.16-0.32**	**35**	**0.22**	**0.15-0.31**
Meningioma	25	0.071	0.045-0.108	15	0.089	0.049-0.150	10	0.053	**0.023-0.105**
Mesenchymal tumours and Primary melanocytic lesions	50	0.16	0.11-0.21	20	0.14	0.09-0.21	25	0.17	**0.11-0.25**
Lymphomas and Hematopoietic Neoplasms	**5**	**0.016**	**0.005-0.039**	*	*	*	*	*	*
Germ Cell Tumours	**60**	**0.20**	**0.15-0.26**	**40**	**0.27**	**0.19-0.36**	**20**	**0.136**	**0.083-0.210**
Tumours of Sellar Region	**60**	**0.20**	**0.16-0.26**	**25**	**0.19**	**0.12-0.27**	**30**	**0.22**	**0.15-0.31**
Tumours of the pituitary	15	0.054	0.031-0.087	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Craniopharyngioma	45	0.15	0.11-0.20	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]
Unclassified Tumours	**195**	**0.64**	**0.55-0.74**	**105**	**0.67**	**0.55-0.82**	**90**	**0.60**	**0.48-0.74**
Hemangioma and all other	20	0.062	0.038-0.098	10	0.070	0.035-0.126	10	0.054	**0.023-0.107**
Neoplasm, unspecified	175	0.58	0.49-0.67	90	0.60	0.49-0.74	80	0.55	**0.44-0.68**
Not classified by CBTRUS	**25**	**0.086**	**0.056-0.125**	**10**	**0.076**	**0.039-0.134**	**15**	**0.095**	**0.052-0.160**
Total	**1,505**	**4.96**	**4.71-5.22**	**835***	**5.35***	**5.00-5.73***	**665***	**4.54***	**4.20-4.90***

Notes: Rates are age-standardized to the 2016 Canadian standard population. Columns and rows may not sum to total due to rounding.

*Lymphomas and Hematopoietic Neoplasms were removed from total cases

[a]Defined as per the Central Brain Tumour Registry of the United States.

[b]Values not available due to non-disclosure agreement.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence interval.

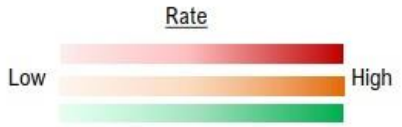


Table 7: Total cases and average annual age-standardized incidence rate (per 100,000) for all primary central nervous system tumours in children (aged 0-14 years) by histopathology group and age at diagnosis, Canada, 2018-2022.

Histopathology* (**major**/specific)	0 to 4 years			5 to 9 years			10 to 14 years		
	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**25**	**0.26**	**0.17-0.38**	**35**	**0.34**	**0.24-0.47**	**40**	**0.38**	**0.27-0.52**
Glioblastoma	10	0.10	0.05-0.19	20	0.19	0.12-0.30	25	0.24	0.16-0.35
Other diffuse astrocytic and oligodendroglial tumours	15	0.16	0.09-0.26	15	0.097	0.046-0.178	15	0.14	0.08-0.24
Other Astrocytic Tumours	**120**	**1.25**	**1.03-1.49**	**120**	**1.16**	**0.96-1.39**	**80**	**0.77**	**0.61-0.96**
Pilocytic astrocytoma	110	1.14	0.94-1.38	115	1.06	0.88-1.28	70	0.67	0.52-0.85
Unique astrocytoma variants	10	0.052	0.017-0.121	10	0.097	0.046-0.178	10	0.096	0.046-0.177
Ependymal Tumours	**35**	**0.36**	**0.25-0.51**	**20**	**0.24**	**0.16-0.36**	**20**	**0.19**	**0.12-0.30**
Other Gliomas	**60**	**0.68**	**0.52-0.86**	**70**	**0.68**	**0.53-0.86**	**50**	**0.48**	**0.36-0.63**
Neuronal and Mixed Neuronal-Glial Tumours	**40**	**0.42**	**0.30-0.57**	**40**	**0.34**	**0.24-0.47**	**50**	**0.43**	**0.32-0.58**
Choroid Plexus Tumours	**25**	**0.26**	**0.17-0.38**	**5**	**0.048**	**0.016-0.113**	**-[c]**	**-[c]**	**-[c]**
Tumours of the Pineal Region	**10**	**0.10**	**0.05-0.19**	**-[b]**	**-[b]**	**-[b]**	**5**	**0.048**	**0.016-0.112**
Embryonal Tumours	**95**	**0.99**	**0.80-1.21**	**65**	**0.63**	**0.49-0.80**	**40**	**0.38**	**0.27-0.52**
Tumours of Cranial and Paraspinal Nerves	20	0.21	0.13-0.32	5	0.048	0.016-0.113	15	0.14	0.08-0.24
Tumours of Meninges	**30**	**0.31**	**0.21-0.44**	**10**	**0.15**	**0.08-0.24**	**30**	**0.29**	**0.19-0.41**
Meningioma	--	--	--	--	--	--	15	0.14	0.08-0.24
Mesenchymal tumours and Primary melanocytic lesions	--	--	--	--	--	--	15	0.14	0.08-0.24
Germ Cell Tumours	**15**	**0.16**	**0.09-0.26**	**10**	**0.097**	**0.046-0.178**	**35**	**0.34**	**0.23-0.47**
Tumours of Sellar Region	**20**	**0.21**	**0.13-0.32**	**15**	**0.15**	**0.08-0.24**	**30**	**0.29**	**0.19-0.41**
Tumours of the pituitary	0	0.00	0	0	0.00	0	15	0.19	0.12-0.30
Craniopharyngioma	20	0.21	0.13-0.32	15	0.15	0.08-0.24	15	0.14	0.08-0.24
Unclassified Tumours	**80**	**0.83**	**0.66-1.03**	**-[b]**	**-[b]**	**-[b]**	**70**	**0.67**	**0.52-0.85**
Hemangioma and all other	10	0.10	0.05-0.19	-[b]	-[b]	-[b]	10	0.096	0.046-0.177
Neoplasm, unspecified	70	0.73	0.57-0.92	-[b]	-[b]	-[b]	60	0.62	0.48-0.80
Other Tumours[b]	**--**	**--**	**--**	**50**	**0.48**	**0.36-0.64**	**--**	**--**	**--**
Not classified by CBTRUS	10	0.10	0.05-0.19	5	0.048	0.016-0.113	10	0.096	0.046-0.177
Total	**570[a]**	**5.92[a]**	**5.44-6.43[a]**	**450**	**4.40**	**4.01-4.83**	**475[c]**	**4.57[c]**	**4.16-5.00[c]**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Counts were rounded for age-specific rate calculation. Columns may not sum to total due to rounding.

*Defined as per the Central Brain Tumour Registry of the United States.

[a]Lymphomas and Hematopoietic Neoplasms were removed from total cases.

[b]Other Tumours group includes Tumours of the Pineal Region, Lymphomas and Hematopoietic Neoplasms, and Unclassified tumours.

[c]Choroid Plexus Tumours and Lymphomas and Hematopoietic Neoplasms were removed from total cases.

-- Data not reported

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence interval

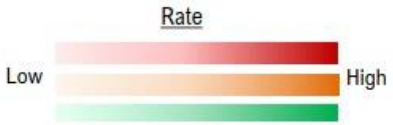


Table 8: Total cases and average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histopathology and age at diagnosis, Canada, 2018-2022.

	15 to 39 years			40 to 64 years			65+ years		
Histopathology[a] (**major**/specific)	**Total cases**	**Rate**	**95% CI**	**Total cases**	**Rate**	**95% CI**	**Total cases**	**Rate**	**95% CI**
Diffuse Astrocytic and Oligodendroglial Tumours	**1,175**	**1.85**	**1.74-1.96**	**4,580**	**7.22**	**7.01-7.43**	**5,165**	**15.06**	**14.65-15.47**
Diffuse astrocytoma	350	0.55	0.50-0.61	305	0.49	0.44-0.55	180	0.52	0.44-0.60
Anaplastic astrocytoma	170	0.27	0.23-0.31	250	0.40	0.35-0.45	135	0.39	0.33-0.46
Glioblastoma	375	0.59	0.53-0.65	3,580	5.64	5.45-5.83	4,760	13.88	13.49-14.28
Oligodendroglioma	175	0.27	0.23-0.32	230	0.36	0.32-0.41	45	0.13	0.1-0.17
Anaplastic oligodendroglioma	80	0.12	0.10-0.16	170	0.27	0.23-0.32	35	0.10	0.07-0.14
Oligoastrocytic tumours	25	0.042	0.028-0.062	35	0.059	0.042-0.082	15	0.041	0.022-0.069
Other Astrocytic Tumours	**175**	**0.29**	**0.25-0.34**	**60**	**0.091**	**0.069-0.117**	**20**	**0.053**	**0.031-0.084**
Pilocytic astrocytoma	140	0.23	0.20-0.27	50	0.080	0.059-0.105	15	0.04	0.02-0.065
Unique astrocytoma variants	35	0.060	0.042-0.083	5	0.011	0.004-0.023	5	0.015	0.005-0.035
Ependymal Tumours	**190**	**0.30**	**0.26-0.35**	**275**	**0.44**	**0.39-0.50**	**105**	**0.31**	**0.25-0.37**
Other Gliomas	**240**	**0.39**	**0.34-0.44**	**305**	**0.48**	**0.43-0.54**	**385**	**1.14**	**1.03-1.26**
Neuronal and Mixed Neuronal-Glial Tumours	**230**	**0.38**	**0.33-0.43**	**160**	**0.26**	**0.22-0.30**	**55**	**0.17**	**0.13-0.22**
Choroid Plexus Tumours	**20**	**0.034**	**0.021-0.053**	**15**	**0.026**	**0.015-0.042**	**5**	**0.024**	**0.010-0.047**
Tumours of the Pineal Region	**25**	**0.041**	**0.027-0.061**	**25**	**0.037**	**0.024-0.056**	**15**	**0.049**	**0.029-0.079**
Embryonal Tumours	**95**	**0.16**	**0.13-0.19**	**25**	**0.039**	**0.025-0.058**	**5**	**0.018**	**0.007-0.040**
Tumours of Cranial and Paraspinal Nerves	**520**	**0.82**	**0.75-0.90**	**1,600**	**2.55**	**2.43-2.68**	**830**	**2.42**	**2.26-2.59**
Tumours of Meninges	**970**	**1.53**	**1.44-1.63**	**5,300**	**8.40**	**8.17-8.63**	**5,780**	**16.98**	**16.54-17.42**
Meningioma	740	1.16	1.08-1.25	4,820	7.64	7.42-7.86	5,505	16.18	15.75-16.61
Mesenchymal tumours and Primary melanocytic lesions	230	0.37	0.32-0.42	475	0.76	0.69-0.83	275	0.80	0.71-0.90
Lymphomas and Hematopoietic Neoplasms	**50**	**0.076**	**0.056-0.101**	**335**	**0.53**	**0.47-0.59**	**670**	**1.95**	**1.81-2.10**
Tumours of Sellar Region	**975**	**1.54**	**1.45-1.64**	**1,950**	**3.09**	**2.96-3.23**	**1,395**	**4.07**	**3.86-4.29**
Tumours of the pituitary	915	1.45	1.36-1.55	1,830	2.90	2.77-3.04	1,325	3.86	3.65-4.07
Craniopharyngioma	55	0.091	0.069-0.119	120	0.19	0.16-0.23	75	0.21	0.17-0.27
Unclassified Tumours	**755**	**1.20**	**1.12-1.29**	**1,835**	**2.90**	**2.77-3.03**	**4,405**	**13.12**	**12.73-13.51**
Hemangioma	70	0.11	0.09-0.14	110	0.17	0.14-0.21	65	0.19	0.14-0.24
Neoplasm, unspecified and all other	685	1.09	1.01-1.17	1,730	2.73	2.60-2.86	4,340	12.93	12.55-13.32
Not classified by CBTRUS	**45**	**0.074**	**0.054-0.099**	**70**	**0.11**	**0.08-0.14**	**70**	**0.21**	**0.16-0.26**
Total*	**5,475**	**8.82**	**8.58-9.05**	**16,535**	**26.17**	**25.77-26.57**	**18,915**	**55.57**	**54.78-56.37**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Columns may not sum to total due to rounding.

[a]Defined as per the Central Brain Tumour Registry of the United States.

*Germ Cell Tumours were removed from total cases.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS =Central Brain Tumour Registry of the United States; CI = confidence interval.

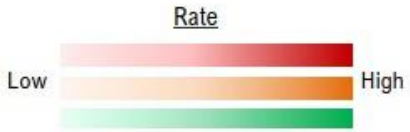


Table 9: Average annual age-standardized incidence rates (per 100,000) for the most common primary central nervous system tumour histopathology groups by age at diagnosis, Canada, 2018-2022.

Age group (years)	Most common Histopathology			Second most common Histopathology			Third most common Histopathology		
	Histopathology[a]	Rate	95% CI	Histopathology[a]	Rate	95% CI	Histopathology[a]	Rate	95% CI
0-4	Pilocytic astrocytoma	1.14	0.94-1.38	Embryonal Tumours	0.99	0.80-1.21	Neoplasm, unspecified	0.78	0.61-0.98
5-9	Pilocytic astrocytoma	1.06	0.88-1.28	Glioma malignant, NOS	0.68	0.53-0.86	Embryonal Tumours	0.63	0.49-0.80
10-14	Pilocytic astrocytoma	0.67	0.52-0.85	Neoplasm, unspecified	0.58	0.44-0.74	Glioma malignant, NOS	0.48	0.36-0.63
15-19	Neoplasm, unspecified	0.81	0.65-1.01	Tumours of the pituitary	0.81	0.65-1.01	Glioma malignant, NOS	0.57	0.44-0.74
20-34	Tumours of the pituitary	1.43	1.31-1.55	Neoplasm, unspecified	0.98	0.89-1.09	Meningioma	0.84	0.75-0.94
35-44	Meningioma	3.70	3.47-3.94	Tumours of the pituitary	2.21	2.02-2.40	Neoplasm, unspecified	1.58	1.43-1.74
45-54	Meningioma	7.12	6.79-7.46	Glioblastoma	4.27	4.01-4.54	Tumours of the pituitary	2.84	2.63-3.06
55-64	Meningioma	9.65	9.27-10.03	Glioblastoma	8.74	8.39-9.11	Neoplasm, unspecified	3.70	3.47-3.93
65+	Meningioma	16.18	15.75-16.61	Glioblastoma	13.87	13.48-14.27	Neoplasm, unspecified	12.94	12.55-13.33
Total	Meningioma	5.77	5.66-5.87	Glioblastoma	4.52	4.42-4.62	Neoplasm, unspecified	3.56	3.47-3.64

Notes: Rates are age-standardized to the 2016 Canadian standard population.
Counts for all age groups (except total) were rounded for age-specific rate calculation.
[a]Defined as per the Central Brain Tumour Registry of the United States.
Data Source: Canadian Cancer Registry at Statistics Canada.
Abbreviations: NOS = not otherwise specified; CI = confidence interval.

Table 10: Total cases and average annual age-standardized incidence rate (per 100,000) for all primary central nervous system tumours by histopathology group and region, 2018-2022.

	Atlantic Region			British Columbia			Ontario			Prairie Region			Quebec		
Histopathology[a] (major/specific)	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**910**	**7.14**	**6.68-7.62**	**1,595**	**6.13**	**5.83-6.43**	**3,970**	**5.31**	**5.14-5.48**	**1,780**	**4.98**	**4.75-5.21**	**2,650**	**6.10**	**5.87-6.33**
Diffuse astrocytoma	50	0.41	0.31-0.55	145	0.54	0.46-0.64	325	0.44	0.39-0.49	155	0.44	0.38-0.52	180	0.42	0.36-0.49
Anaplastic astrocytoma	40	0.33	0.24-0.45	65	0.24	0.18-0.31	175	0.24	0.20-0.27	105	0.30	0.24-0.36	180	0.42	0.36-0.49
Glioblastoma	760	5.92	5.50-6.36	1,275	4.91	4.65-5.19	3,200	4.27	4.12-4.42	1,380	3.83	3.63-4.04	2,130	4.88	4.68-5.10
Oligodendroglioma	35	0.29	0.21-0.41	65	0.25	0.19-0.32	170	0.23	0.20-0.27	85	0.24	0.19-0.30	90	0.21	0.17-0.26
Anaplastic oligodendroglioma	20	0.18	0.11-0.27	45	0.18	0.13-0.24	95	0.13	0.10-0.16	55	0.16	0.12-0.21	70	0.16	0.12-0.20
Other Astrocytic Tumours	**40**	**0.34**	**0.24-0.46**	**70**	**0.27**	**0.21-0.35**	**185**	**0.26**	**0.22-0.30**	**160**	**0.47**	**0.40-0.55**	**115**	**0.27**	**0.23-0.33**
Pilocytic astrocytoma	35	0.28	0.20-0.40	60	0.24	0.19-0.31	155	0.22	0.18-0.25	145	0.42	0.36-0.50	100	0.25	0.20-0.30
Unique astrocytoma variants	5	0.058	0.023-0.121	10	0.032	0.014-0.063	30	0.041	0.028-0.059	15	0.043	0.024-0.072	10	0.029	0.015-0.051
Ependymal Tumours	**50**	**0.39**	**0.28-0.52**	**70**	**0.27**	**0.21-0.34**	**215**	**0.29**	**0.26-0.34**	**155**	**0.44**	**0.37-0.52**	**155**	**0.37**	**0.31-0.43**
Other Gliomas	**60**	**0.47**	**0.36-0.61**	**105**	**0.41**	**0.34-0.50**	**500**	**0.68**	**0.62-0.74**	**255**	**0.73**	**0.64-0.82**	**195**	**0.45**	**0.39-0.52**
Neuronal and Mixed Neuronal-Glial Tumours	**30**	**0.27**	**0.18-0.38**	**85**	**0.33**	**0.26-0.41**	**210**	**0.29**	**0.25-0.33**	**110**	**0.31**	**0.26-0.38**	**135**	**0.32**	**0.27-0.38**
Tumours of the Pineal Region	**5**	**0.050**	**0.018-0.111**	**15**	**0.052**	**0.028-0.088**	**30**	**0.045**	**0.031-0.063**	**20**	**0.061**	**0.038-0.094**	**10**	**0.021**	**0.010-0.041**
Embryonal Tumours	**15**	**0.10**	**0.05-0.18**	**25**	**0.11**	**0.07-0.16**	**140**	**0.20**	**0.16-0.23**	**60**	**0.18**	**0.14-0.23**	**85**	**0.21**	**0.17-0.26**
Tumours of Cranial and Paraspinal Nerves	**110**	**0.88**	**0.72-1.06**	**460**	**1.79**	**1.63-1.96**	**1,075**	**1.46**	**1.37-1.55**	**590**	**1.68**	**1.55-1.82**	**760**	**1.78**	**1.65-1.91**
Tumours of Meninges	**685**	**5.42**	**5.02-5.84**	**1,540**	**5.96**	**5.66-6.26**	**3,940**	**5.34**	**5.17-5.51**	**2,570**	**7.18**	**6.90-7.47**	**3,365**	**7.74**	**7.48-8.01**
Meningioma	640	5.04	4.65-5.44	1,440	5.57	5.28-5.86	3,315	4.49	4.34-4.65	2,450	6.85	6.58-7.13	3,225	7.40	7.15-7.66
Mesenchymal tumours and Primary melanocytic lesions	45	0.38	0.28-0.51	100	0.39	0.32-0.48	625	0.85	0.78-0.92	115	0.33	0.27-0.39	140	0.34	0.28-0.40
Lymphomas and Hematopoietic Neoplasms	**95**	**0.70**	**0.56-0.86**	**170**	**0.64**	**0.55-0.75**	**385**	**0.51**	**0.46-0.56**	**155**	**0.43**	**0.36-0.50**	**255**	**0.58**	**0.51-0.65**
Germ Cell Tumours	**10**	**0.056**	**0.023-0.119**	**25**	**0.094**	**0.060-0.141**	**55**	**0.071**	**0.053-0.093**	**25**	**0.076**	**0.050-0.112**	**30**	**0.073**	**0.049-0.105**
Tumours of Sellar Region	**225**	**1.78**	**1.55-2.03**	**655**	**2.52**	**2.33-2.72**	**1,160**	**1.57**	**1.48-1.66**	**1,140**	**3.23**	**3.05-3.43**	**1,180**	**2.75**	**2.59-2.91**
Tumours of the pituitary	210	1.66	1.44-1.90	625	2.39	2.21-2.59	1,055	1.43	1.34-1.52	1,085	3.07	2.89-3.26	1,090	2.53	2.38-2.69
Craniopharyngioma	15	0.12	0.06-0.20	35	0.13	0.09-0.18	105	0.14	0.12-0.17	55	0.16	0.12-0.21	90	0.21	0.17-0.26
Unclassified Tumours	**90**	**0.71**	**0.57-0.87**	**220**	**0.84**	**0.73-0.96**	**5,740**	**7.66**	**7.46-7.86**	**190**	**0.55**	**0.48-0.63**	**955**	**2.16**	**2.02-2.30**
All Other Tumours*	**5**	**0.064**	**0.028-0.130**	**70**	**0.27**	**0.21-0.34**	**190**	**0.252**	**0.217-0.291**	**20**	**0.068**	**0.043-0.102**	**70**	**0.17**	**0.14-0.22**
Total	**2,320**	**18.34**	**17.6-19.11**	**5,105**	**19.67**	**19.13-20.22**	**17,795**	**23.92**	**23.57-24.28**	**7,235**	**20.38**	**19.91-20.85**	**9,965**	**22.99**	**22.54-23.45**

Notes: Rates are age-standardised to the 2016 Canadian standard population. Prairie region includes Alberta, Saskatchewan and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador. The territories are not displayed due to small case counts. Quebec incidence estimates were based on cases diagnosed from 2013 to 2017. Nova Scotia incidence estimates were based on cases diagnosed from 2015 to 2019. Columns may not sum to totals due to rounding.

*All other tumours group includes oligoastrocytic tumours, Choroid plexus tumours and tumours not classified by CBTRUS.

[a]Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence interval.

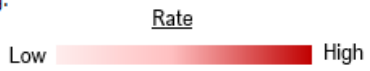


Table 11: Total cases and average annual age-standardized incidence rates (per 100,000) for primary malignant central nervous system tumours by histopathology group and region, 2018-2022.

	Atlantic Region			British Columbia			Ontario			Prairie Region			Quebec		
Histopathology[a] (**major**/specific)	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**910**	**7.14**	**6.68-7.62**	**1,595**	**6.12**	**5.82-6.43**	**3,975**	**5.31**	**5.14-5.48**	**1,780**	**4.98**	**4.75-5.21**	**2,650**	**6.10**	**5.87-6.33**
Diffuse astrocytoma	50	0.41	0.31-0.55	145	0.54	0.46-0.64	325	0.44	0.39-0.49	155	0.44	0.38-0.52	180	0.42	0.36-0.49
Anaplastic astrocytoma	40	0.33	0.24-0.45	65	0.24	0.18-0.31	175	0.24	0.20-0.27	105	0.30	0.24-0.36	180	0.42	0.36-0.49
Glioblastoma	760	5.92	5.50-6.36	1,280	4.91	4.65-5.19	3,200	4.27	4.12-4.42	1,380	3.83	3.63-4.04	2,135	4.88	4.68-5.10
Oligodendroglioma	35	0.29	0.21-0.41	65	0.25	0.19-0.32	175	0.23	0.20-0.27	85	0.24	0.19-0.30	90	0.21	0.17-0.26
Anaplastic oligodendroglioma	20	0.18	0.11-0.27	45	0.18	0.13-0.24	95	0.13	0.10-0.16	55	0.16	0.12-0.21	70	0.16	0.12-0.20
Other Astrocytic Tumours	**35**	**0.31**	**0.22-0.43**	**65**	**0.25**	**0.20-0.33**	**170**	**0.24**	**0.20-0.28**	**145**	**0.44**	**0.37-0.51**	**110**	**0.26**	**0.21-0.31**
Ependymal Tumours	**25**	**0.20**	**0.13-0.30**	**40**	**0.16**	**0.12-0.22**	**125**	**0.17**	**0.14-0.20**	**70**	**0.21**	**0.17-0.27**	**80**	**0.19**	**0.15-0.24**
Other Gliomas	**60**	**0.47**	**0.36-0.61**	**105**	**0.41**	**0.34-0.50**	**500**	**0.68**	**0.62-0.74**	**255**	**0.72**	**0.64-0.82**	**195**	**0.45**	**0.39-0.52**
Embryonal Tumours	**10**	**0.10**	**0.05-0.18**	**25**	**0.11**	**0.07-0.16**	**140**	**0.20**	**0.16-0.23**	**60**	**0.18**	**0.14-0.23**	**90**	**0.21**	**0.17-0.26**
Tumours of Meninges	**15**	**0.087**	**0.043-0.158**	**20**	**0.085**	**0.053-0.130**	**180**	**0.24**	**0.20-0.28**	**40**	**0.11**	**0.08-0.15**	**55**	**0.13**	**0.09-0.17**
Lymphomas and Hematopoietic Neoplasms	**90**	**0.70**	**0.56-0.86**	**170**	**0.64**	**0.55-0.75**	**380**	**0.51**	**0.46-0.56**	**155**	**0.43**	**0.36-0.50**	**255**	**0.58**	**0.51-0.65**
Germ Cell Tumours	**5**	**0.056**	**0.023-0.119**	**20**	**0.074**	**0.045-0.117**	**50**	**0.068**	**0.051-0.090**	**25**	**0.073**	**0.047-0.109**	**25**	**0.063**	**0.041-0.093**
Unclassified Tumours	**65**	**0.49**	**0.38-0.63**	**125**	**0.49**	**0.41-0.58**	**600**	**0.80**	**0.74-0.87**	**80**	**0.23**	**0.18-0.28**	**505**	**1.14**	**1.04-1.24**
All Other Tumours*	**15**	**0.11**	**0.06-0.19**	**50**	**0.19**	**0.14-0.25**	**185**	**0.25**	**0.21-0.29**	**70**	**0.19**	**0.15-0.25**	**70**	**0.17**	**0.13-0.21**
Total	**1,225**	**9.65**	**9.12-10.21**	**2,220**	**8.54**	**8.19-8.90**	**6,305**	**8.45**	**8.24-8.66**	**2,685**	**7.55**	**7.27-7.85**	**4,035**	**9.29**	**9.00-9.58**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Prairie region includes Alberta, Saskatchewan and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador. The territories are not displayed due to small case counts. Quebec incidence estimates were based on cases diagnosed from 2013 to 2017. Nova Scotia incidence estimates were based on cases diagnosed from 2015 to 2019. Columns may not sum to totals due to rounding.

*All other tumours group includes Oligoastrocytic tumours, Neuronal and Mixed Neuronal-Glial Tumours, Choroid Plexus Tumours, Tumours of the Pineal Region, Tumours of Cranial and Paraspinal Nerves, Tumours of Sellar Region, and tumours Not classified by CBTRUS.

[a]Defined as per the Central Brain Tumour Registry of the United States.

Rate

Low — High

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence interval.

Table 12: Total cases and average annual age-standardized incidence rates (per 100,000) for primary non-malignant central nervous system tumours by histopathology group and region, 2018-2022.

	Atlantic Region			British Columbia			Ontario			Prairie Region			Quebec		
Histopathology[a] (**major**/specific)	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI	Total cases	Rate	95% CI
Ependymal Tumours	**25**	**0.19**	**0.12-0.28**	**30**	**0.11**	**0.07-0.16**	**90**	**0.12**	**0.10-0.15**	**80**	**0.23**	**0.18-0.29**	**75**	**0.18**	**0.14-0.22**
Neuronal and Mixed Neuronal-Glial Tumours	**30**	**0.24**	**0.16-0.34**	**65**	**0.25**	**0.19-0.32**	**150**	**0.21**	**0.17-0.24**	**85**	**0.25**	**0.20-0.31**	**115**	**0.28**	**0.23-0.33**
Tumours of Cranial and Paraspinal Nerves	**105**	**0.87**	**0.71-1.05**	**455**	**1.78**	**1.62-1.96**	**1,065**	**1.45**	**1.36-1.54**	**590**	**1.67**	**1.54-1.81**	**755**	**1.77**	**1.65-1.90**
Tumours of Meninges	**675**	**5.33**	**4.93-5.75**	**1,520**	**5.87**	**5.58-6.18**	**3,765**	**5.10**	**4.94-5.27**	**2,525**	**7.07**	**6.80-7.35**	**3,310**	**7.61**	**7.35-7.88**
Tumours of Sellar Region	**225**	**1.76**	**1.53-2.01**	**650**	**2.48**	**2.30-2.68**	**1,150**	**1.56**	**1.47-1.65**	**1,120**	**3.17**	**2.99-3.36**	**1,180**	**2.74**	**2.59-2.90**
Tumours of the pituitary	210	1.64	1.43-1.88	615	2.36	2.18-2.55	1,050	1.42	1.33-1.51	1,065	3.01	2.83-3.20	1,085	2.53	2.38-2.68
Craniopharyngioma	15	0.12	0.06-0.20	30	0.13	0.09-0.18	105	0.14	0.12-0.17	55	0.16	0.12-0.21	95	0.21	0.17-0.26
Unclassified Tumours	**25**	**0.22**	**0.14-0.32**	**90**	**0.35**	**0.28-0.43**	**5,140**	**6.86**	**6.67-7.05**	**110**	**0.32**	**0.27-0.39**	**445**	**1.02**	**0.92-1.11**
All Other Tumours*	**15**	**0.097**	**0.05-0.172**	**75**	**0.29**	**0.23-0.37**	**130**	**0.18**	**0.15-0.21**	**35**	**0.11**	**0.08-0.15**	**45**	**0.11**	**0.08-0.15**
Total	**1,095**	**8.69**	**8.18-9.23**	**2,885**	**11.13**	**10.73-11.55**	**11,485**	**15.47**	**15.19-15.76**	**4,555**	**12.82**	**12.45-13.2**	**5,925**	**13.70**	**13.36-14.06**

Notes: Rates are age-standardized to the 2016 Canadian standard population. Prairie region includes Alberta, Saskatchewan and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador. The territories are not displayed due to small case counts. Quebec incidence estimates were based on cases diagnosed from 2013 to 2017. Nova Scotia incidence estimates were based on cases diagnosed from 2015 to 2019. Columns may not sum to totals due to rounding.

*All other tumours group includes Diffuse Astrocytic and Oligodendroglial Tumours, Other Astrocytic Tumours, Other Gliomas, Choroid Plexus Tumours, Tumours of the Pineal Region, Lymphomas and Hematopoietic Neoplasms, Germ Cell Tumours, and tumours Not classified by CBTRUS.

Rate

Low High

[a]Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada.

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence interval.

Table 13: Total cases and average annual age-standardized incidence rates (per 100,000 using the 2000 US standard population) for all primary central nervous system tumours by histopathology group and behaviour, Canada, US Cancer Statistics, 2018-2022.

	Canada									United States								
	Total			Malignant			Non-malignant			Total			Malignant			Non-malignant		
Histopathology[a] (major/specific)	Total Cases	Rate	95% CI	Total Cases	Rate	95% CI	Total Cases	Rate	95% CI	Total Cases	Rate	95% CI	Total Cases	Rate	95% CI	Total Cases	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	**11,010**	**4.58**	**4.49-4.67**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	**85,657**	**4.37**	**4.34-4.40**						
Diffuse astrocytoma	865	0.44	0.41-0.47	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	7,872	0.47	0.46-0.48						
Anaplastic astrocytoma	565	0.27	0.25-0.30	565	0.27	0.25-0.30	0	0	0	5,210	0.3	0.29-0.31	5,210	0.3	0.29-0.31	0	0	0
Glioblastoma	8,770	3.46	3.38-3.53	8,770	3.46	3.38-3.53	0	0	0	67,250	3.28	3.26-3.31	67,250	3.28	3.26-3.31	0	0	0
Oligodendroglioma	450	0.23	0.21-0.26	450	0.23	0.21-0.26	0	0	0	3,742	0.23	0.22-0.24	3,742	0.23	0.22-0.24	0	0	0
Anaplastic oligodendroglioma	285	0.14	0.12-0.16	285	0.14	0.12-0.16	0	0	0	1,497	0.09	0.08-0.09	1,497	0.09	0.08-0.09	0	0	0
Oligoastrocytic tumours	80	0.037	0.029-0.047	80	0.037	0.029-0.047	0	0	0	86	0	0.00-0.01	86	0	0.00-0.01	0	0	0
Other Astrocytic Tumours	**570**	**0.36**	**0.33-0.39**	**530**	**0.34**	**0.31-0.37**	**40**	**0.025**	**0.017-0.034**	**6,517**	**0.44**	**0.43-0.45**				**462**	**0.03**	**0.03-0.03**
Pilocytic astrocytoma	500	0.32	0.29-0.35	500	0.32	0.29-0.35	0	0.00	0	5,537	0.37	0.36-0.38	5,537	0.37	0.36-0.38	0	0	0
Unique astrocytoma variants	70	0.045	0.035-0.057	35	0.020	0.014-0.029	40	0.025	0.017-0.034	980	0.06	0.06-0.07	518	0.03	0.03-0.04	462	0.03	0.03-0.03
Ependymal Tumours	**645**	**0.33**	**0.30-0.36**	**345**	**0.18**	**0.16-0.20**	**295**	**0.15**	**0.13-0.16**	**6,939**	**0.41**	**0.40-0.42**	**3,627**	**0.22**	**0.21-0.22**	**3,312**	**0.19**	**0.18-0.20**
Other Gliomas	**1,120**	**0.56**	**0.53-0.59**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	**9,777**	**0.59**	**0.58-0.60**						
Glioma malignant, NOS	1,110	0.55	0.52-0.59	1,110	0.55	0.52-0.59	0	0	0	9,667	0.58	0.57-0.59	9,667	0.58	0.57-0.59	0	0	0
Other neuroepithelial tumours	10	0.005	0.002-0.010	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	110	0.01	0.01-0.01						
Neuronal and Mixed Neuronal-Glial Tumours	**575**	**0.32**	**0.30-0.35**	**125**	**0.060**	**0.049-0.072**	**450**	**0.26**	**0.24-0.29**	**5,438**	**0.34**	**0.33-0.35**	**951**	**0.05**	**0.05-0.06**	**4,487**	**0.29**	**0.28-0.30**
Choroid Plexus Tumours	**75**	**0.043**	**0.034-0.055**	**10**	**0.006**	**0.003-0.012**	**65**	**0.037**	**0.029-0.048**	**815**	**0.05**	**0.05-0.06**	**127**	**0.01**	**0.01-0.01**	**688**	**0.04**	**0.04-0.05**
Tumours of the Pineal Region	**85**	**0.043**	**0.034-0.054**	**60**	**0.032**	**0.024-0.041**	**25**	**0.01**	**0.01-0.02**	**723**	**0.04**	**0.04-0.05**	**457**	**0.03**	**0.03-0.03**	**266**	**0.02**	**0.01-0.02**
Embryonal Tumours	**330**	**0.21**	**0.19-0.24**	**330**	**0.21**	**0.19-0.24**	**0**	**0**	**0**	**3,000**	**0.21**	**0.20-0.21**	**3,000**	**0.21**	**0.20-0.21**	**0**	**0**	**0**
Tumours of Cranial and Paraspinal Nerves	**3,000**	**1.35**	**1.30-1.41**	**15**	**0.009**	**0.005-0.014**	**2,980**	**1.35**	**1.30-1.40**	**39,428**	**2.08**	**2.06-2.11**						
Tumours of Meninges	**12,120**	**5.10**	**5.01-5.20**	**305**	**0.13**	**0.11-0.15**	**11,815**	**4.97**	**4.88-5.06**	**214,600**	**10.99**	**10.95-11.04**	**2,535**	**0.14**		**212,065**	**10.85**	
Meningioma	11,090	4.61	4.52-4.70	225	0.093	0.081-0.107	10,860	4.52	4.43-4.61	208,658	10.66	10.61-10.70	1,677	0.09	0.08-0.09	206,981	10.57	10.53-10.62
Mesenchymal tumours	1,005	0.48	0.45-0.51	60	0.027	0.020-0.036	945	0.45	0.42-0.48	5,786	0.33	0.32-0.34	757	0.04	0.04-0.05	5,029	0.28	0.28-0.29
Primary melanocytic lesions	25	0.012	0.008-0.018	20	0.009	0.005-0.014	5	0.003	0.001-0.007	156	0.01	0.01-0.01	101	0.01	0.00-0.01	55	0	0.00-0.00
Lymphomas and Hematopoietic Neoplasms	**1,060**	**0.42**	**0.39-0.45**	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	**8,594**	**0.43**	**0.42-0.44**						
Germ Cell Tumours	**135**	**0.090**	**0.076-0.106**	**125**	**0.082**	**0.069-0.098**	**10**	**0.008**	**0.004-0.014**	**1,181**	**0.08**	**0.07-0.08**	**1,039**	**0.07**	**0.06-0.07**	**142**	**0.01**	**0.01-0.01**
Tumours of Sellar Region	**4,385**	**2.01**	**1.95-2.07**	**40**	**0.019**	**0.014-0.026**	**4,345**	**1.99**	**1.93-2.06**	**88,202**	**5**	**4.96-5.03**	**455**	**0.02**	**0.02-0.03**	**87,747**	**4.97**	
Tumours of the pituitary	4,085	1.86	1.81-1.92	40	0.019	0.014-0.026	4,045	1.84	1.79-1.90	85,068	4.81	4.78-4.85	455	0.02	0.02-0.03	84,613	4.79	4.76-4.82
Craniopharyngioma	300	0.15	0.13-0.17	0	0	0	300	0.15	0.13-0.17	3,134	0.18	0.18-0.19	0	0	0	3,134	0.18	0.18-0.19
Unclassified Tumours	**7,200**	**3.03**	**2.96-3.11**	**1,380**	**0.55**	**0.52-0.58**	**5,815**	**2.49**	**2.42-2.55**	**18,847**	**1.02**	**1.01-1.04**						
Hemangioma	255	0.12	0.11-0.14	-[b]	-[b]	-[b]	-[b]	-[b]	-[b]	4,611	0.26	0.25-0.27						
Neoplasm, unspecified	6,905	2.89	2.82-2.96	1,370	0.54	0.51-0.57	5,535	2.35	2.29-2.41	13,810	0.74	0.72-0.75	7,220	0.37	0.37-0.38	6,590	0.36	0.35-0.37
All other	35	0.020	0.014-0.028	5	0.005	0.002-0.009	25	0.015	0.010-0.023	426	0.03	0.02-0.03	60	0	0.00-0.01	366	0.02	0.02-0.02
Total	**42,500**	**18.46**	**18.29-18.63**	**16,505**	**7.17**	**7.06-7.28**	**25,995**	**11.29**	**11.16-11.42**	**489,718**	**26.05**	**25.97-26.12**	**128,865**	**6.86**	**6.82-6.90**	**360,853**	**19.19**	**19.12-19.25**

Notes: Rates are age-standardized to the 2000 US standard population. Columns and rows may not sum to totals due to rounding.
aDefined as per the Central Brain Tumour Registry of the United States.
[b]Values not available due to non-disclosure agreement.
Darks gray section in columns represents data not reported.
Data Source: Canadian Cancer Registry at Statistics Canada.
Abbreviations: NOS = not otherwise specified. CI = confidence interval

Table 14: Average annual age-standardized incidence rates (per 100,000 using the 2000 US standard population) for all primary central nervous system tumours in children (aged 0-14 years), AYA (aged 15-39 years) and adults (aged 40+ years) by histopathology.

	Canada						United States					
	Chidren (0-14 years)		AYA (15-39 years)		Adults (40+ years)		Children (0-14 years)		AYA (15-39 years)		Adults (40+ years)	
Histopathology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Diffuse Astrocytic and Oligodendroglial Tumours	0.32	0.26-0.39	1.85	1.75-1.96	9.05	8.86-9.24	0.31	0.29-0.33	1.76	1.72-1.79	8.55	8.48-8.61
Other Astrocytic Tumours	1.04	0.93-1.16	0.30	0.26-0.35	0.074	0.058-0.095	1.26	1.22-1.30	0.35	0.33-0.36	0.1	0.09-0.11
Ependymal Tumours	0.24	0.19-0.30	0.30	0.26-0.35	0.39	0.35-0.44	0.29	0.27-0.30	0.35	0.33-0.36	0.52	0.50-0.53
Other Gliomas	0.62	0.53-0.71	0.40	0.35-0.45	0.67	0.62-0.72	0.93	0.90-0.96	0.4	0.39-0.42	0.57	0.56-0.59
Neuronal and Mixed Neuronal-Glial Tumours	0.41	0.34-0.48	0.38	0.33-0.43	0.24	0.21-0.27	0.45	0.43-0.47	0.4	0.39-0.42	0.23	0.22-0.24
Choroid Plexus Tumours	0.096	0.064-0.138	0.03	0.02-0.05	0.025	0.016-0.038	0.11	0.10-0.13	0.04	0.03-0.05	0.03	0.03-0.04
Tumours of the Pineal Region	0.056	0.033-0.090	0.04	0.03-0.06	0.038	0.027-0.053	0.05	0.04-0.05	0.04	0.04-0.05	0.04	0.04-0.05
Embryonal Tumours	0.66	0.57-0.76	0.16	0.13-0.19	0.033	0.022-0.048	0.68	0.66-0.71	0.12	0.11-0.13	0.04	0.03-0.04
Tumours of Cranial and Paraspinal Nerves	0.135	0.097-0.183	0.82	0.76-0.90	2.42	2.32-2.52	0.12	0.11-0.14	1.03	1.00-1.06	3.93	3.89-3.98
Tumours of Meninges	0.23	0.18-0.29	1.57	1.47-1.67	10.57	10.37-10.77	0.22	0.20-0.23	2.33	2.29-2.38	23.51	23.41-23.62
Lymphomas and Hematopoietic Neoplasms	0.017	0.005-0.038	0.077	0.057-0.102	0.91	0.86-0.98	0.03	0.02-0.04	0.09	0.09-0.10	0.9	0.88-0.92
Germ Cell Tumours	0.20	0.16-0.26	0.121	0.095-0.153	0.006	0.002-0.014	0.16	0.15-0.18	0.11	0.10-0.12	0.01	0.01-0.01
Tumours of Sellar Region	0.20	0.16-0.26	1.55	1.45-1.65	3.32	3.20-3.44	0.59	0.57-0.62	4.78	4.72-4.84	7.37	7.31-7.43
Unclassified Tumours	0.64	0.55-0.74	1.22	1.13-1.31	5.79	5.65-5.94	0.3	0.28-0.32	0.5	0.48-0.52	1.81	1.78-1.84
All Malignant Tumour	3.213	3.01-3.42	3.24	3.10-3.39	12.58	12.36-12.80	3.48	3.41-3.55	3.16	3.11-3.21	11.6	11.53-11.68
All Non-malignant Tumour	1.739	1.59-1.89	5.66	5.47-5.85	21.09	20.80-21.38	2.03	1.98-2.08	9.16	9.07-9.24	36.02	35.89-36.15
Total	4.95	4.70-5.21	8.90	8.67-9.14	33.67	33.31-34.03	5.51	5.42-5.59	12.31	12.22-12.41	47.6	47.47-47.78

Notes: Rates are age-standardized to the 2000 US standard population. Columns may not sum to totals due to rounding.

[a]Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada. US data as reported by CBTRUS

Abbreviations: CBTRUS = Central Brain Tumour Registry of the United States; CI = confidence Interval

Table 15: Annual cases and age-standardized incidence rates (per 100,000) for primary central nervous system tumours by histopathology group and diagnosis year, Canada (Excluding Quebec and Nova Scotia) 2010-2022, and Quebec 2010-2017

	Canada								Quebec							
	Glioblastoma		Malignant tumours		Non-malignant tumours		All primary CNS tumours		Glioblastoma		Malignant tumours		Non-malignant tumours		All primary CNS tumours	
	Annual		Annual		Annual		Annual		Annual		Annual		Annual		Annual	
Year	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)	Cases	Rate (95% CI)
2010	910	3.99 (3.73-4.26)	2005	8.54 (8.17-8.93)	3680	15.53 (15.03-16.04)	5685	24.07 (23.45-24.71)	425	5.83 (5.28-6.42)	855	11.57 (10.80-12.38)	230	3.06 (2.67-3.49)	1085	14.62 (13.76-15.53)
2011	990	4.23 (3.97-4.50)	2110	8.83 (8.46-9.22)	3645	15.12 (14.63-15.63)	5760	23.96 (23.34-24.59)	410	5.46 (4.94-6.03)	840	11.04 (10.3-11.82)	1320	17.59 (16.65-18.57)	2160	28.63 (27.43-29.87)
2012	1015	4.26 (4.00-4.53)	2105	8.61 (8.25-8.99)	3735	15.15 (14.67-15.65)	5840	23.77 (23.16-24.39)	405	5.31 (4.80-5.86)	940	12.19 (11.42-13.00)	1925	25.10 (23.99-26.25)	2865	37.29 (35.93-38.69)
2013	1060	4.32 (4.06-4.59)	2220	8.86 (8.49-9.24)	3700	14.72 (14.25-15.21)	5915	23.58 (22.98-24.19)	415	5.39 (4.88-5.94)	750	9.60 (8.93-10.32)	1045	13.25 (12.46-14.08)	1795	22.85 (21.81-23.94)
2014	1065	4.24 (3.99-4.50)	2075	8.17 (7.82-8.52)	3750	14.65 (14.18-15.12)	5830	22.81 (22.23-23.41)	425	5.36 (4.86-5.90)	815	10.27 (9.57-11.00)	1150	14.38 (13.56-15.24)	1965	24.65 (23.57-25.76)
2015	1110	4.32 (4.07-4.58)	2205	8.49 (8.14-8.85)	3700	14.20 (13.75-14.67)	5905	22.69 (22.12-23.28)	430	5.35 (4.85-5.88)	820	10.10 (9.42-10.82)	1160	14.30 (13.49-15.15)	1975	24.40 (23.33-25.5)
2016	1150	3.74 (3.51-3.98)	2230	7.95 (7.61-8.29)	3900	13.71 (13.27-14.16)	6130	21.66 (21.1-22.22)	430	4.95 (4.48-5.45)	835	10.20 (9.52-10.91)	1240	16.04 (15.18-16.93)	2080	26.24 (25.14-27.37)
2017	1180	4.35 (4.11-4.61)	2175	8.03 (7.70-8.38)	3850	14.21 (13.76-14.66)	6025	22.24 (21.68-22.81)	430	5.14 (4.67-5.65)	815	9.74 (9.09-10.44)	1335	16.03 (15.18-16.91)	2150	25.77 (24.69-26.88)
2018	1185	4.28 (4.04-4.53)	2305	8.32 (7.98-8.67)	4040	14.61 (14.16-15.06)	6345	22.93 (22.37-23.50)								
2019	1280	4.51 (4.27-4.76)	2415	8.53 (8.19-8.88)	3925	13.89 (13.46-14.33)	6340	22.42 (21.87-22.98)								
2020	1315	4.52 (4.28-4.77)	2405	8.31 (7.98-8.65)	3605	12.54 (12.13-12.95)	6010	20.84 (20.32-21.38)								
2021	1315	4.42 (4.18-4.67)	2550	8.65 (8.32-9.00)	4060	13.89 (13.47-14.33)	6610	22.55 (22.01-23.10)								
2022	1255	4.12 (3.89-4.35)	2325	7.72 (7.40-8.04)	3955	13.19 (12.78-13.61)	6275	20.91 (20.39-21.44)								

Notes: Rates are age-standardized to the 2016 Canadian standard population in the Canada column. Rates are age-standardized to the 2016 Quebec population in the Quebec column. Quebec data are only available up to the year 2017.
Data Source: Canadian Cancer Registry at Statistics Canada.
Abbreviations: CNS = Central Nervous System; CI = confidence interval.

Quebec data 2011 and 2012 were considered

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Appendix

Brain and other central nervous system tumour histopathology groupings

Histopathology	ICD-O-3* Histopathology and Behaviour Code
Diffuse Astrocytic and Oligodendroglial Tumours	
Diffuse astrocytoma	9381/3, 9400/3, 9410/3, 9411/3, 9420/3, 9442/1
Anaplastic astrocytoma	9401/3
Glioblastoma	9440/3, 9441/3, 9442/3, 9445/3
Oligodendroglioma	9450/3
Anaplastic oligodendroglioma	9451/3, 9460/3
Oligoastrocytic tumours	9382/3
Other Astrocytic Tumours	
Pilocytic astrocytoma	9421/1, 9421/3, 9425/3
Unique astrocytoma variants	9424/3, 9384/1, 9431/1
Ependymal Tumours	9391/3, 9392/3, 9393/3, 9396/3, 9383/1, 9391/1 (excluding site C75.1), 9394/1
Other Gliomas	
Glioma malignant, NOS	9380/3, 9385/3
Other neuroepithelial tumours	9423/3, 9430/3, 9444/1
Neuronal and Mixed Neuronal-Glial Tumours	8680/3, 8693/3, 9490/3, 9505/3, 9509/3, 9522/3 (site C30.0 only), 9523/3 (site C30.0 only), 8680/0,1, 8681/1, 8690/1, 8693/1, 9412/1, 9413/0, 9490/0, 9492/0 (excluding site C75.1), 9493/0, 9505/0,1, 9506/1, 9509/1
Choroid Plexus Tumours	9390/3, 9390/0,1
Tumours of the Pineal Region	9362/3, 9395/3, 9360/1, 9361/1
Embryonal Tumours	8963/3, 9364/3, 9470/3, 9471/3, 9472/3, 9473/3, 9474/3, 9475/3, 9476/3, 9477/3, 9478/3, 9480/3, 9500/3, 9501/3, 9502/3, 9508/3
Tumours of Cranial and Paraspinal Nerves	9540/3, 9560/3, 9561/3, 9571/3 9540/0,1, 9541/0, 9550/0, 9560/0,1, 9570/0, 9571/0, 9562/0, 9563/0
Tumours of Meninges	
Meningioma	9530/3, 9537/3, 9538/3, 9539/3 9530/0,1, 9531/0, 9532/0, 9533/0, 9534/0, 9535/0, 9537/0, 9538/1, 9539/1
Mesenchymal tumours	8710/3, 8711/3, 8800/3, 8801/3, 8802/3, 8803/3, 8804/3, 8805/3, 8806/3, 8810/3, 8811/3, 8815/3, 8825/3, 8830/3, 8840/3, 8850/3, 8851/3, 8852/3, 8853/3, 8854/3, 8857/3,

	8890/3, 8900/3, 8901/3, 8902/3, 8910/3, 8912/3, 8920/3, 8921/3, 8935/3, 8990/3, 9040/3, 9120/3, 9130/3, 9150/3, 9170/3, 9180/3, 9220/3, 9231/3, 9240/3, 9243/3, 9260/3, 9370/3, 9371/3, 9372/3, 8324/0, 8711/0, 8800/0, 8810/0, 8811/0, 8815/0,1, 8821/1, 8824/0,1, 8825/0,1, 8830/0,1, 8831/0, 8835/1, 8836/1, 8840/0, 8850/0,1, 8851/0, 8852/0, 8854/0, 8857/0, 8861/0, 8870/0, 8880/0, 8890/0,1, 8897/1, 8900/0, 8920/1, 8935/0,1, 8990/0,1, 9040/0, 9120/0, 9125/0, 9130/0,1, 9131/0, 9136/1, 9150/0,1, 9161/0,1, 9170/0, 9180/0, 9210/0, 9220/0, 9241/0, 9373/0
Primary melanocytic lesions	8720/3, 8728/3, 8770/3, 8728/0,1, 8770/0
Lymphomas and Hematopoietic Neoplasms	9590/3, 9591/3, 9596/3, 9650/3, 9651/3, 9652/3, 9653/3, 9654/3, 9655/3, 9659/3, 9661/3, 9662/3, 9663/3, 9664/3, 9665/3, 9667/3, 9670/3, 9671/3, 9673/3, 9675/3, 9680/3, 9684/3, 9687/3, 9688/3, 9690/3, 9691/3, 9695/3, 9698/3, 9699/3, 9701/3, 9702/3, 9705/3, 9712/3, 9714/3, 9715/3, 9719/3, 9724/3, 9727/3, 9728/3, 9729/3, 9735/3, 9737/3, 9738/3, 9750/3, 9751/3, 9755/3, 9756/3, 9811/3, 9812/3, 9813/3, 9814/3, 9815/3, 9816/3, 9817/3, 9818/3, 9819/3, 9823/3, 9826/3, 9827/3, 9831/3, 9832/3, 9837/3, 9861/3, 9866/3, 9930/3, 9965/3, 9966/3, 9967/3, 9971/3, 9975/3, 9750/1, 9751/1, 9970/1, 9731/3, 9733/3, 9734/3, 9740/3, 9741/3, 9749/3, 9753/3, 9754/3, 9757/3, 9758/3, 9759/3, 9760/3, 9766/3,, 9860/3, 9740/1, 9752/1, 9753/1, 9766/1
Germ Cell Tumours	8440/3, 9060/3, 9061/3, 9064/3, 9065/3, 9070/3, 9071/3, 9072/3, 9080/3, 9081/3, 9082/3, 9083/3, 9084/3, 9085/3, 9100/3, 9101/3, 8440/0, 9080/0,1
Tumours of Sellar Region	
Tumours of the pituitary	8140/3, 8246/3, 8260/3, 8270/3, 8272/3, 8280/3, 8281/3, 8290/3, 8300/3, 8310/3, 8323/3, 9580/3, 8040/0,1, 8140/0,1, 8146/0, 8260/0, 8270/0, 8271/0, 8272/0, 8280/0, 8281/0, 8290/0, 8300/0, 8310/0, 8323/0, 9391/1, (site C75.1 only), 9432/1, 9492/0 (site C75.1 only), 9580/0, 9582/0
Craniopharyngioma	9350/1, 9351/1, 9352/1
Unclassified Tumours	
Hemangioma	9133/3, 9140/3 9121/0, 9122/0, 9123/0, 9133/1
Neoplasm, unspecified	8000/3, 8001/3, 8002/3, 8003/3, 8004/3, 8005/3, 8010/3, 8020/3, 8021/3, 8000/0,1, 8001/0,1, 8005/0, 8010/0
All other	8320/3, 8452/3, 8896/3, 8980/3, 9503/3, 8452/1, 8713/0, 9084/0, 9173/0, 9363/0

Not classified by Central Brain Tumor Registry of United States (CBTRUS)	8004/1, 8070/0,3, 8158/1,3, 8240/1,3, 8249/3, 8272/1, 8681/3, 8683/0, 8713/1, 8721/0, 8745/3, 8860/0, 8936/3, 9064/1, 9085/0, 9120/1, 9121/1, 9131/1, 9161/3, 9252/0, 9272/0, 9350/0,3, 9351/0,3, 9352/0,3, 9360/3, 9361/3, 9362/1, 9380/0,1, 9383/0,3, 9384/3, 9391/0, 9394/0,3, 9400/0,1, 9413/3, 9424/0,1, 9431/3, 9440/1, 9444/3, 9450/0, 9490/1, 9492/1, 9500/0,1, 9501/1, 9506/3, 9531/1,3, 9532/1, 9533/3, 9534/1, 9537/1, 9538/0, 9539/0, 9971/1

* International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.

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